



JOURNAL

OF THE

Royal United Service Institution

PUBLISHED UNDER THE AUTHORITY OF THE COUNCIL.

Editor - Captain H. GARBETT, R.N. (Retired).

Vol. XLVI.—15th NOVEMBER, 1902.—No. 297.

	PAGE
No. I.—NEW GERMAN FIRST-CLASS BATTLE-SHIP "KAISER BARBAROSSA"; 11,150 Tons; 13,000-I.H.P.; Speed, 18 Knots.	
„ II.—EXPERIENCES IN SOUTH AFRICA WITH A NEW INFANTRY RANGE - FINDER. Lecture by Professor G. Forbes, F.R.S., M.A., M.Inst.C.E.	1381
„ III.—ANCHORS: OLD FORMS AND RECENT DEVELOPMENTS. Lecture by Captain Anthony S. Thomson, C.B., Elder Brother of Trinity House, Commander R.N.R.	1400
„ IV.—THE PRESENT AND FUTURE OF ARABIA. By Major Otto Wachs. Translated by permission from the "Marine Rundschau"	1419
„ V.—THE FRENCH NAVAL MANŒUVRES OF 1902	1436
„ VI.—THE VOYAGE OF THE "CHARMING NANCY," 1776. By Colonel F. A. Whinyates, late R.H.A.	1457
„ VII.—Naval Notes	1460
„ VIII.—Military Notes	1476
„ IX.—Correspondence:—A Criticism on Captain G. W. Redway's Lecture, "Complexity in Army Accounts," by Colonel Hurlock Pritchard, late Accountant-General, Military Department, Government of India	1486
„ X.—Naval and Military Calendar for October, 1902	1487
„ XI.—Contents of Foreign Journals for October, 1902	1491
„ XII.—Notices of Books, and Principal Additions to Library in October, 1902	1496

All Communications should be addressed to the Editor.

LONDON :

PRINTERS J. J. KELIHER & CO., LTD., 99, VICTORIA STREET, S.W.
AND 33, KING WILLIAM STREET, E.C.

Price Two Shillings.

Entered at Stationers' Hall.

[All rights reserved.]

Sole Advertisement Contractor:—

Mr. C. GILBERT-WOOD, F.R.G.S., Granville House, Arundel Street, Strand, London, W.C.

Awarded THE GRAND PRIX, Paris, 1900.

ROSS' Patent New Model PRISMATIC BINOCULAR GLASSES.

LONDON MADE.

'The Great Power and Large Field of a Telescope in the Compass of an Opera Glass,' HAVE NO EQUAL.



Fig. 1.

'ONCE FOCUSED ALWAYS READY.'

Fig. 1. With Simultaneous Focussing Adjustment.

Power 8 times ...	£8	10	0	net.
" 10 " ...	9	10	0	"
" 12 " ...	10	10	0	"

Fig. 2. Focussing by Revolving Eye-pieces only.

Power 8 times ...	£8	0	0	net.
" 10 " ...	9	0	0	"
" 12 " ...	10	0	0	"

LEATHER CASES INCLUDED.

Also Telescopes, Photographic Outfits, &c.

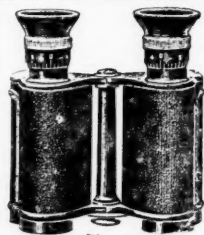


Fig. 2

PRICE LISTS FREE.

Gold Medals and Highest Awards at all Great Exhibitions.

ROSS, LTD.,

111, NEW BOND STREET,
LONDON, W.

Contractors to His Majesty's Governments, British and Colonial.

ESTABLISHED 1830.

Established Jan., 1894.



WOOD'S Advertising and Publishing Offices.

Telephone No. 4680, GERRARD.

Sole Advertisement Contractor to the
Naval & Military Press.

ALL THE WORLD'S FIGHTING SHIPS

(Supported by the British, Russian, Japanese, Norwegian, and Argentine Governments).

THE ROYAL NAVY LIST (Supported by the Admiralty).

THE JOURNAL OF THE ROYAL UNITED SERVICE INSTITUTION

(Published under the Authority of the Council).

THE ELECTRO-CHEMIST AND METALLURGIST.

HOW TO ENTER THE ROYAL NAVY.

THE NAVAL AND MILITARY REVIEW.

THE NAVAL DIARY AND HANDBOOK.

FELIX CIVIL SERVICE GUIDE.

FELIX EDUCATIONAL SERIES.

THE STATE CORRESPONDENT, &c., &c.

Lowest Office Rates and Special Discounts for Advertisements in ALL Newspapers.

C. GILBERT-WOOD, F.R.G.S.,

PUBLISHER AND ADVERTISEMENT CONTRACTOR,

GRANVILLE HOUSE, 3, ARUNDEL STREET, STRAND, W.C.

ALL COMMUNICATIONS MUST BE ADDRESSED TO THE FIRM.

THE STEREOSCOPIC COMPANY'S SANDERSON CAMERA.

FOR HAND OR STAND.



LIGHT AND COMPACT.

PERFECT for every class of work
at home or abroad.

LONG EXTENSION for Telephoto Work
and copying same size.

ENORMOUS RISE with OPTIONAL SWING FRONT

for taking High Objects at close range.

The great beauty of the instrument lies in the fact
that a more simple Camera to use could not be
constructed, yet its reserve adjustments embrace
a range of movements never before embodied in a
single instrument, and make it capable of executing
work of the most extreme character.

BOOKLET POST FREE.

COMPLETE PHOTOGRAPHIC OUTFITS PROVIDED FOR EXPEDITIONS, Etc.

Binocular and Prismatic Field Glasses and Telescopes.

Amateur's Negatives Developed, Printed, and Enlarged.

... 200-PAGE CATALOGUE FREE ON APPLICATION. ...

THE LONDON STEREOSCOPIC COMPANY, The Pioneers of . . . Amateur Photography,
106 & 108, REGENT STREET, W., and 54, CHEAPSIDE, E.C.



The Goldsmiths Company's 50/- NOTED 'SERVICE' WATCH

Manufactured expressly for Military
Campaigning, and used under Service
Conditions in all parts of the World
with complete success.

Goldsmiths Company.

*Hundreds of these Watches have
been sold to Officers and others
serving in South Africa, with
excellent results.*

KEYLESS LEVER WATCH

jewelled in all holes, guaranteed a perfect
timekeeper, in shallow, and smooth case,
from which it can only be removed by raising
winding catch and unscrewing from the
front, thus rendering it both dust & air tight.

In Oxidised Steel Case ...	£2 10s.
In Solid Silver Case ...	£3 10s.
In 18-ct. Gold Case ...	£12 0s.

WATCH LIST POST FREE.

UNSOLICITED TESTIMONIAL JUST RECEIVED.

"Please put enclosed Watch in a Silver Case. The metal has,
as you see, rusted considerably, but I am not surprised, as I wore
it continually on my wrist for three months and a half. It kept
most excellent time and never failed me.—Yours truly,

"Capt. North Staffs Regt."

The Goldsmiths & Silversmiths Company,
(The Goldsmiths' Alliance, Ltd. (A. B. Savory & Sons), late of Cornhill, is transferred to this Co.) LTD.
112, REGENT STREET, LONDON, W.

**CAPTAIN JAMES, P.S.C. (Honours), late R.E.,
Mr. E. CARLISLE, M.A. Cantab.,
CAPTAIN M. H. GREGSON, late R.E.,
5, LEXHAM GARDENS, CROMWELL ROAD, LONDON, W.,**

Prepare Resident and Non-Resident Pupils for the Navy, the Army,
all Civil Service Examinations and the Universities.

Special facilities are also afforded to Officers studying for the Staff College,
Promotion, Ordnance College, and Interpreterships.

RECENT SUCCESSES INCLUDE—

WOOLWICH, December, 1901.		
13th—D. D. Haskard	10,071	52nd—B. R. Cooper 9,041
27th—P. U. Johnson	9,518	53rd—G. J. P. St. Clair 9,023
28th—E. Cummings	9,500	70th—C. H. Ommannay 8,740
July, 1901.		
20th—G. H. Donnelly	9,699	64th—R. F. Cottrell 8,275
SANDHURST, December, 1901.		
CAVALRY.		
10th—F. B. Hurndall	5,781	16th—L. C. B. Merriman... .. 5,133
INFANTRY.		
96rd—G. R. H. B. Maitland-Addison...	6,491	— C. A. Tennyson* 5,596
— —J. Stirling*	5,893	— H. A. Ibbotson 5,573
July, 1901.		
3rd Cavalry—V. C. P. Hodgson	7,539	104th Infantry—H. Hart... .. 5,807
45th Infantry—H. G. Bignell	6,723	120th " H. T. C. Jones-Vaughan 5,590
96th " M. J. Raikes	5,911	4th King's India Cadet J. S. Oldham ... 5,521
97th " J. G. P. Romanes	5,886	
INDIA FORESTS, July, 1901.		
5th—Pelham Stewart Corbould		6,550
COOPER'S HILL, July, 1901.		
— F. W. Abbatt... ..		

MILITIA MILITARY COMPETITIVE.

Special arrangements have been made to meet the requirements of Militia Officers preparing for the Competitive Examinations to be held under the new regulations, and the important subjects of MATHEMATICS and MILITARY HISTORY are under the personal supervision of Mr. CARLISLE and CAPTAIN JAMES respectively.

A Special Class in which particular attention is given to those who require rapid preparation and individual attention in the subjects which now embrace such an extensive range, has been started.

Our successes under the old regulations have been very marked.

September, 1901.		
<i>Under the New Regulations.</i>		
INFANTRY.		
10th—C. W. Watson	16,949	— *M. L. Slaughter 9,730
13th—H. C. Stephen	14,830	— *W. C. Hutcheson... .. 9,683
— *H. A. Hildebrand	9,750	— *G. H. M. Marsh 9,661
UNIVERSITY.		
13th—A. E. Burnett	5,035	14th—R. C. G. Pollock 4,970
CAVALRY.		
— E. R. Holloway		10,162
March, 1901.		
<i>Under the New Regulations.</i>		
CAVALRY.		
1st—C. E. Pym	18,159	2nd—H. H. Webber 14,160
ROYAL ARTILLERY.		
4th—K. E. Milford	17,357	6th—J. W. Povah 16,898
FOOT GUARDS.		
4th—E. S. Ward		8,281
INFANTRY.		
3rd—M. Fisher	18,676	10th—C. J. O'Sullivan 17,956
8th—T. E. Bennett... ..	18,163	22nd—L. A. Jones 16,733
9th—H. J. U. Wilkins	17,981	— *V. F. Jackson 15,401
UNIVERSITY CANDIDATES.		
2nd—G. Thwaites	6,570	25th R. G. Raw 4,550
3th—A. F. Attwood	5,415	33rd—G. M. Jennings 4,080
<i>Under the Old Regulations.</i>		
INFANTRY.		
3rd—H. L. Ainsworth		20,255

STAFF COLLEGE.

August, 1901.

The following Officers, who read exclusively with us, passed on the Competitive List:—

Capt. J. W. E. DONALDSON, Royal Field Artillery.
Capt. G. McK. FRANKS, Royal Garrison Artillery.
Capt. G. A. F. SANDERS, Royal Engineers.
Capt. A. GRANT-DUFF, 1st Bn. Royal Highlanders.
Capt. A. H. H. WILSON, 2nd Bn. Wiltshire Regt.
Capt. N. MALCOLM, D.S.O., 2nd Bn. Argyll and Sutherland Highlanders.
Capt. S. W. KING, Indian Staff Corps.
Capt. H. D. FARQUHARSON, Royal Marine Light Infantry.

And in addition, the following Officers received Nominations:—

Brevet Colonel A. W. MONKEY, Royal Artillery.
Capt. A. R. FINLAY, 2nd Bn. Bedfordshire Regt.

* Subsequently admitted.

PROMOTION.

THIRTY-EIGHT OFFICERS passed last year for promotion, raising the total
number passed from us for this examination to

SIX HUNDRED AND FIFTY-NINE.

ESTABLISHED 1798.



ROYAL WARRANT HOLDERS
SINCE 1848.

HAVANNAH CIGARS.

From the celebrated Factory
of RAMON ALLONES.

25/-, 40/-, 50/-, and 75/-
per 100.

Sample 5 for 1/6, 2/-, 3/-,
or 4/-.

IMPORTED CIGARETTES

HIGH CLASS.

Per Box of 100 5/-, 6/-,

7/- and 8/-.

Sample 10 for 8, 10, 12 or
14 Stamps.

"DELAMORE"

A very cool and fragrant,
yet unscented, SMOKING
MIXTURE, of choicest
American Tobaccos. Highly
recommended.

Per 1-lb. Tin 2/-, 1/2-lb. 4/-.

Any of above sent Post Free on receipt of Order.

Price List on application.

WOOLLEY & COWLEY, 19, St. Dunstan's Hill, London, E.C.


Telegraphic Address—

"RUSSATUS, LONDON."

CONTENTS FOR NOVEMBER, 1902.

1. NEW GERMAN FIRST-CLASS BATTLE-SHIP "KAISER BARBAROSSA," 11,150 TONS; 13,000-I.H.P.; SPEED, 18 KNOTS.
2. EXPERIENCES IN SOUTH AFRICA WITH A NEW INFANTRY RANGE-FINDER. LECTURE BY PROFESSOR G. FORBES, F.R.S., M.A., M.INST.C.E. ... 1381
3. ANCHORS: OLD FORMS AND RECENT DEVELOPMENTS. LECTURE BY CAPTAIN ANTHONY S. THOMSON, C.B., ELDER BROTHER OF TRINITY HOUSE, COMMANDER R.N.R. 1400
4. THE PRESENT AND FUTURE OF ARABIA. BY MAJOR OTTO WACHS. TRANSLATED BY PERMISSION FROM THE "MARINE-RUNDSCHAU." ... 1419
5. THE FRENCH NAVAL MANŒUVRES OF 1902 1436
6. THE VOYAGE OF THE "CHARMING NANCY," 1776. BY COLONEL F. A. WHINYATES, LATE R.H.A. 1457
7. NAVAL NOTES 1460
8. MILITARY NOTES 1476
9. CORRESPONDENCE:—A CRITICISM ON CAPTAIN G. W. REDWAY'S LECTURE, "COMPLEXITY IN ARMY ACCOUNTS," BY COLONEL HURLOCK PRITCHARD, LATE ACCOUNTANT-GENERAL, MILITARY DEPARTMENT, GOVERNMENT OF INDIA 1486
10. NAVAL AND MILITARY CALENDAR FOR OCTOBER, 1902 1487
11. CONTENTS OF FOREIGN JOURNALS FOR OCTOBER, 1902 1491
12. NOTICES OF BOOKS, AND PRINCIPAL ADDITIONS TO LIBRARY IN OCTOBER, 1902 1496

FRED C BAYLEY



SHIRT MAKER
HOSIER AND
COLONIAL OUTFITTER

PYJAMAS
UMBRELLAS
TRUNKS, RUGS ETC.

TAILOR
INDIA

34-35, STRAND LONDON W.C.

BURBERRYS

(Tailors and Designers to WAR OFFICE.)



SLIP-ON

Cavalry and Infantry Patterns.

Made of TARTAN GABARDINE,
the Colour Sealed by the War Office
for Service Caps.

The SLIP-ON has stood the severest tests throughout the South African War, and is now officially recommended as Optional Kit. Its powers of resisting rain are incontestable, and it maintains the normal warmth of the body under the most adverse conditions.

Officers' Uniforms . .

Prices given for INDIVIDUAL or REGIMENTAL NEW SERVICE, CEREMONIAL, MESS, or FROCK with or without Accoutrements, on the WAR OFFICE plan of supplying materials, or carried through entirely.

30, Haymarket, LONDON. And BASINGSTOKE.

EVANS & CO.,

Tailors & Breeches Makers.



RAINPROOF RAGLAN
OVERCOATS
From 3 Guineas.

Vide "LAND AND WATER," October 27th, 1900:

"The name of Messrs. Evans and Co. is well known. Reasonable price, good material, and smart cut make their goods immensely popular among those officers who are sportsmen. It has taken some twenty years to build up the reputation of the firm, and it has been well earned.

"Every man who shoots knows what a comfort good breeches are which do not impede the action of the knees, and at the same time will look smart even when well worn. Evans and Co.'s Shooting Breeches are based on a long experience of the wants and wishes of Sportsmen at home and abroad."

We keep a CHOICE & SELECT STOCK OF MATERIALS for

**Frock Coats, Blue Serge Suits,
Dress Suits, Trouserings,
Tweed Suits, &c., &c.**

INSPECTION INVITED.

Patterns and form for measurements will be forwarded to those who are unable to call, and satisfaction is guaranteed.

P.J.J. writes from nr. Bath, Dec. 28, 1901:

"Dear Sir,—Knickerbockers and Norfolk fit very well. I am quite satisfied with the clothes, and they certainly fit better than any of the local tailors can manage to do, although they have opportunities for trying on before completion."

"New Club, Johannesburg.

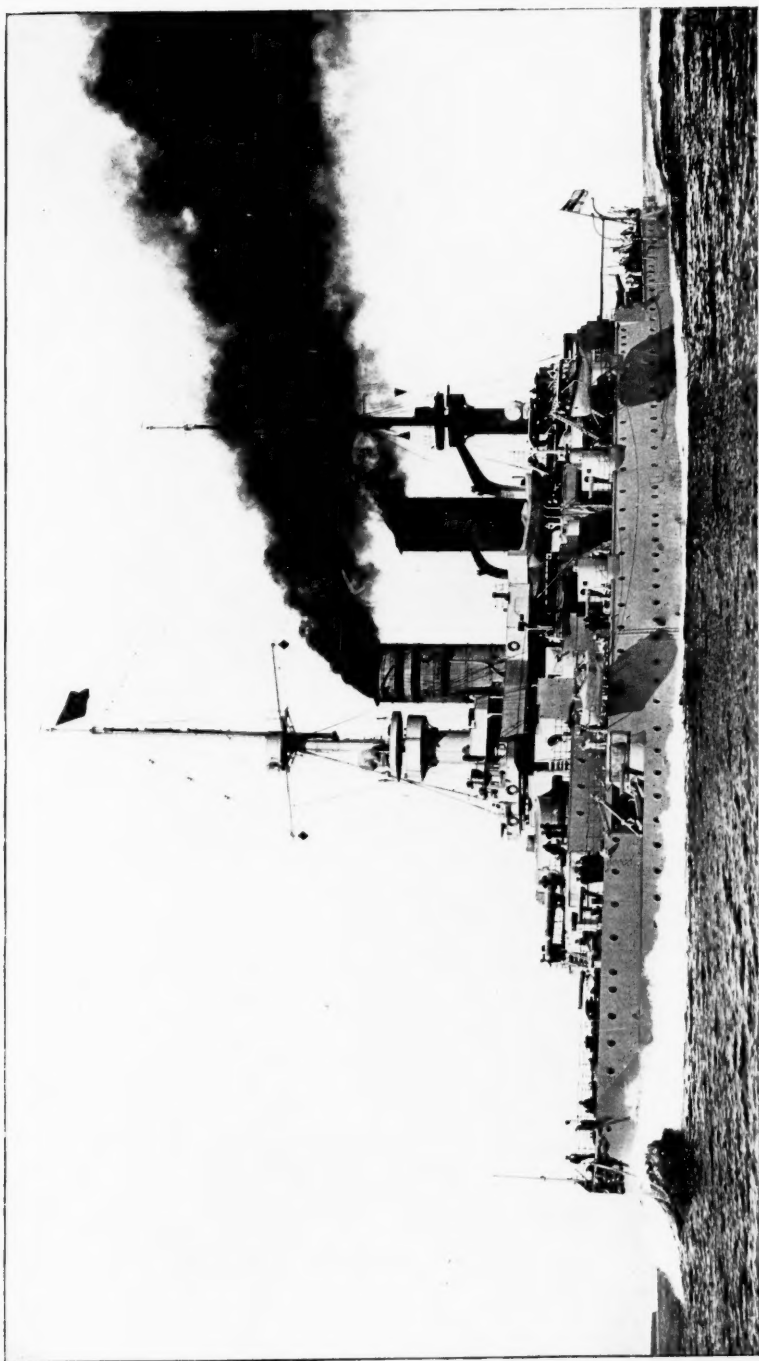
"W. EVANS AND Co., London.

"Dear Sirs,—You will be pleased to hear I have this day received the suit of clothes you made me last January. I have tried them on, and they give me the greatest satisfaction.

"Yours truly, L.W."

These are a few recent Testimonials, amongst hundreds, we have received.
The originals can be seen.

77, GREAT PORTLAND ST., LONDON, W.



NEW GERMAN FIRST-CLASS BATTLE-SHIP "KAISER BARBAROSSA," 11,150 Tons; 13,000-I.H.P.; Speed, 18 Knots.

ARMOUR PROTECTION:—Water-line belt to 3 feet above water from the gun aft for four-fifths of the length, 11·8-inch tapering to 5·9-inch; turrets for heavy guns, 9·8-inch; turrets for secondary armament, 6-inch; casemates, 6-inch; armoured deck, 3-inch to 2·5-inch.
ARMAMENT:—Four 9·4-inch 40-calibre Q.F. guns; twelve 5·9-inch Q.F. in separate casemates, and six of the same guns in turrets; twelve 3·4-inch Q.F. guns behind shields, with twelve 3 and 1 pounders, and eight machine guns. Six torpedo-tubes; one in stem and two on each broadside, submerged, with one above water in the stern.

J. J. K. & Co., Ltd., London.



SECOND EDITION now ready

*SO GREAT HAS THE DEMAND BEEN FOR THE
NOVEMBER ISSUE THAT THE FIRST LARGE
EDITION HAS BEEN ENTIRELY EXHAUSTED.*

KING and COUNTRY

A Review and Magazine.

Price HALF - A - CROWN.

NOVEMBER Number contains :

MARIE CORELLI

ON

The VULGARITY of WEALTH.

THE NEW IMPERIAL P.-M.-G. By J. HENNIKER
HEATON, M.P.

THE BRITISH OUTLOOK. By SIR FREDERICK
YOUNG.

AN AMERICAN INCIDENT. By THE DUKE OF
ARGYLL.

AN IMPERIAL CONFERENCE BY POST.

By LORD ROSEBURY, RIGHT HON. A. J. BALFOUR, M.P., LORD CURZON,
SIR E. BARTON, PROF. BEARE, RIGHT HON. JAS. BRYCE, &c.,

And many other Articles of Absorbing Interest.

The DECEMBER Number of

KING and COUNTRY

will be ready on the 25th inst., and will
contain contributions from the pens of

**GUY BOOTHBY,
F. C. SELOUS**

and other writers of equal prominence.

ORDER EARLY.

At all Bookstalls and Booksellers.

London: HORACE MARSHALL and SONS, Temple House, Temple Avenue,
E.C.

ROYAL UNITED SERVICE INSTITUTION

PRESIDENT.

Field-Marshal H.R.H. The DUKE OF CAMBRIDGE, K.G., &c.
Hon. Colonel-in-Chief to the Forces.

VICE-PRESIDENTS.

Admiral Rt. Hon. Sir J. C. DALRYMPLE HAY, Bart., G.C.B., D.C.L., F.R.S.
General Sir F. C. A. STEPHENSON, G.C.B., Constable of the Tower.
Admiral Sir ERASMUS OMMANNEY, K.C.B., LL.D., F.R.S.
General Lord CHELMSFORD, G.C.B., G.C.V.O.
Admiral Sir E. G. FANSHAWE, G.C.B., Admiral H. BOYS, F.R.G.S.
Field-Marshal Sir J. LINTON A. SIMMONS, G.C.B., G.C.M.G., R.E.
Lieut.-Colonel T. H. BAYLIS (K.C.), V.D., late 18th Middlesex V.R.C.

CHAIRMAN.

Admiral Sir NATHANIEL BOWDEN-SMITH, K.C.B.

VICE-CHAIRMAN.

Major-General JOHN BARTON STERLING, late Coldstream Guards.

MEMBERS OF THE COUNCIL.

Major W. ANSTRUTHER-THOMSON, F.S.A., Royal Horse Guards.
Commander G. A. BALLARD, R.N., Admiralty (Gold Medalist, R.U.S.I.).
Colonel S. G. BIRD, C.B., 1st Middlesex Vol. R.C.
Lieut.-Colonel J. H. BOB, C.M.G., R.M.A., D.A.A.G., Royal Marines, Extra Equerry to H.R.H. The Prince of Wales.
Lieut.-General Sir W. F. BUTLER, K.C.B., Commanding Western District.
Commander W. F. CARONE, C.B., Royal Naval Reserve.
Colonel T. S. CAYE, 1st Vol. Bn. Hampshire Regiment.
Major-General Lord CHEYLMORE.
Sir G. H. CHUBB, Bart., late Captain 4th Vol. Bn. East Surrey Regiment.
Admiral of the Fleet The Earl of Clanwilliam, G.C.B., K.C.M.G.
Major G. T. FORESTER-WALKER, R.A., p.s.c., D.A.Q.M.G., for Military Intelligence.
Colonel G. F. GUYON, Commanding 7th and 57th Regimental Districts.
Colonel Lonsdale A. HAILE, late R.E.
Colonel Sir W. A. BAILIE HAMILTON, K.C.M.G., C.B., Lothians and Berwickshire Imperial Yeomanry.
Surgeon-General J. JACKSON, M.D., C.B., Hon. Surgeon to the King.
Major-General Sir G. H. MARSHALL, K.C.B., commanding R.A., 1st Army Corps, Aldershot District.

Major-General Sir J. F. MAURICE, K.C.B., R.A., p.s.c.
Rear-Admiral H. J. MAY, C.B.
Vice-Admiral Sir GERARD H. U. NOEL, K.C.B., K.C.M.G., Admiral Superintendent of Naval Reserves (Gold Medalist R.U.S.I.).
Colonel Lord RAGLAN, Royal Monmouthshire R.E. (Militia), Lieut.-Governor of the Isle of Man.
Colonel F. C. ROMER, C.M.G., 6th Bn. The Lancashire Fusiliers.
Admiral Lord CHARLES T. M. D. SCOTT, J.C.B., Com-in-Chief, Plymouth.

Secretary.

Lieut. Colonel R. M. HOLDEN, 4th Bn. The Cameronians (Scottish Rifles), A.D.C. to the Inspector-General of Auxiliary Forces.

Editor and Librarian.

Captain H. J. G. GARNETT, R.N. (retired).

Assistant Editor and Librarian.

Major C. B. WYLLY, late 1st Bn. South Staffordshire Regiment.

The undermentioned can become members by intimating their wish to the Secretary, and either forwarding to him their subscription, or giving him a written authority on their bankers or agents for its payments:—Commissioned officers of the Royal Navy, Regular Army, Royal Marines, Militia, Indian and Colonial Naval and Military Forces, Imperial Yeomanry, Royal Naval Reserve, Volunteer Corps, and Cadet Battalions and Corps, as published in the Official Navy and Army Lists, together with retired officers of the same whose names are retained in the Navy or Army Lists, and Naval Cadets and Cadets of the Royal Military Academy, Woolwich, and Royal Military College, Sandhurst, on the recommendation of their commanding officers.

Officers retired from the various Services enumerated above whose names do not appear in the Navy or Army Lists, are eligible for election by ballot on the recommendation, on personal knowledge, of two members of the Institution.

The terms of subscription are:—

Annual. £1 1s. 0d. entrance; and £1 1s. 0d. annual, payable on the 1st January each year.

Life. £15, payable in one sum.

Life. £15 15s., payable in three instalments of Five Guineas each; the first on joining the Institution, the others on the 1st January of each of the succeeding two years.

Members joining after the 1st October in any year are not called upon for any subscription the following year.

An extra payment of Ten Shillings entitles a member in the United Kingdom to the loan of Four Volumes at a time from the Library for a period of twelve months from the date of the subscription.

When a member desires to pay his subscription through his banker or agent, he should send to the Secretary a written authority as follows:

To (Banker or Agents)

On receipt of this order please pay to Secretary, Royal United Service Institution, or order, my subscription to that Institution (according to the terms above).

Name in full.

Rank, Ship, or Regiment.

Address to which Journals and other communications should be sent.

The name of any member who fails to pay his annual subscription for two years is removed from the List of Members, but the member may be re-admitted as a new member on the usual terms.

Members of the United Service Institution of India on leave to the United Kingdom, and officers of the Colonial Naval and Military Forces who are temporarily in this country on duty, can become temporary members, and make use of the Institution on payment of Five Shillings per six months.

The Institution contains the best professional Library in the United Kingdom; an excellent collection of Maps and Charts; Reading and Smoking Rooms provided with the leading papers, periodicals, and writing materials, and where tea and coffee, &c., can be obtained; an interesting Museum; and a Theatre in which lectures upon professional subjects, followed by discussion, are frequently given.

The Journal, published monthly, is sent post free to all members. It contains the lectures given in the Theatre, articles on professional subjects, naval and military notes, book notices, &c.

THE JOURNAL OF THE ROYAL UNITED SERVICE INSTITUTION.

VOL. XLVI.

NOVEMBER, 1902.

No. 297.

[Authors alone are responsible for the contents of their respective Papers.]

EXPERIENCES IN SOUTH AFRICA WITH A NEW INFANTRY RANGE-FINDER.

By Professor G. FORBES, F.R.S., M.A., M.Inst.C.E.

Tuesday, 13th May, 1902.

General JOHN H. DUNNE in the Chair.

INTRODUCTION.

THE folding range-finder exhibited to-day is the type designed for use with the rifle up to 3,000 yards, though in practice it has been found to be of great service with field artillery. It is the result of work I have been engaged upon intermittently since 1889, and continuously since 1898. It seemed most undesirable to exhibit it until it was as perfect as one could make it, and also suitable for rough work. Having now thoroughly tested it both at home and in actual service, I have great confidence in presenting this infantry range-finder to your consideration.

In July, 1901, the folding range-finder was sufficiently perfect to exhibit it and test it thoroughly at the Bisley Meeting of the National Rifle Association.

In September, 1901, photographs and description were sent to Lord Kitchener in South Africa. I received the following reply from his C.S.O., Major Congreve :—

“ . . . Lord Kitchener desires me to thank you for drawing his attention to your invention, and will be very glad to have it thoroughly tested if you will forward one to him here.”

I then resolved to take the range-finder to South Africa to submit it to practical tests. Having informed the War Office, the Director-General of Ordnance wrote as follows :—

“ . . . a letter has been sent to the General Officer Commanding-in-Chief, South Africa, informing him that you are proceeding to South Africa of your own initiative and at your own expense, and that you wish to try your range-finder in that country.

"Lord Kitchener has been directed, should he think it desirable to make any trial, to send a full report to this office. . . ."

Arrived at Cape Town, I communicated with Lord Kitchener through General Sir H. Settle. Lord Kitchener telegraphed as follows:—

"As I wish to spare Professor Forbes trouble of journey up here, please have his invention tested by competent authorities and send me the reports."

General Settle's C.S.O. wrote me as follows:—

"He [General Settle] proposes that you should go to General French at Beaufort West, who would see that your invention is tested in the field."

Accordingly, after making tests for accuracy at the Royal Observatory, Cape Town, which were forwarded to Lord Kitchener, I proceeded to Beaufort West.

Major-General Stephenson put me in communication with Colonel Crabbe (Grenadier Guards), formerly musketry instructor at Aldershot, who invited me to his camp and carried out competitive tests between my range-finder and the Service mekometer. His report on these tests was forwarded by General French to Lord Kitchener.

General French, Major-General Stephenson, and Colonel Crabbe then agreed that I should go with the latter's column, about to act in a combined movement against six commandoes of the enemy north of Beaufort West, where some hard fighting was expected.

I trekked a fortnight with the column, and the colonel had many opportunities of testing the value of the range-finder.

General French forwarded to Lord Kitchener Colonel Crabbe's report on the range-finder.

I then asked Lord Kitchener whether, in reference to his request for reports on the range-finder, there was anything else I could do, and expressed my willingness to do everything in my power. He replied as follows:—

"Reports sent in on your range-finder seem most exhaustive, and I do not think anything further is necessary. I will submit them to the War Office in due course. Regret that I cannot make a personal inspection of the instrument."

I showed this reply to General French, who agreed that nothing more was required, saying that the officer who had reported was most competent for the duty, and that his reports were most decidedly favourable.

Accordingly I returned, after two months spent in the Colony, and arrived home on 12th April, 1902.

PRACTICAL TRIALS OF THE RANGE-FINDER IN SOUTH AFRICA.

I arrived in South Africa on 28th January, 1902. The first trials were made during ten days at the Royal Observatory, Capetown. The distances had been surveyed by one of the astronomers. During this period I found that in all conditions of the weather I generally could obtain

EXPERIENCES IN S. AFRICA WITH A NEW RANGE-FINDER. 1383

2 per cent. accuracy at 3,000 yards, often much closer. This was not new to me, as I had thoroughly tested for accuracy at home.

One day, 5th February, my observations happened to be witnessed by Major-General Sir John Ardagh, Lieut.-Colonel Edmonds, R.E., and Sir David Gill, K.C.B., F.R.S., who thereupon drew up and signed a certificate. The binocular had been dismantled the day before and the zero hastily determined; and Sir David Gill pointed out that the correction for zero could be made. When this was done the results were as follows:—

Object.	Distance in yards.	Observed by R.F.	Error.
Mowbray Church...	1,859	1,830	+29
House of Refuge ...	3,036	3,039	- 3
N.E. Corner Cottages (between Observatory and Salt River ...	852	857	- 5
Chimney of Cement Works, Salt River ...	1,432	1,422	+10
Chimney in Salt River Railway Works ...	1,711	1,717	- 6

It was desirable to show a certified day's work without any corrections; so the next day I returned to the Observatory, and Sir David Gill certified the following list, including every observation made that day:—

6th February, 1902.—Range-finder Tests.—Range-finder observed by Professor George Forbes, F.R.S. Range-finder read off by Mr. Levinger, Astronomer. Certified by Sir David Gill, K.C.B., F.R.S., H.M. Astronomer.

Object.	R.F. observed. Yards.	R.F. Mean. Yards.	Survey. Yards.	Error. Yards.
Mowbray Church ...	{ 1,860 1,885 1,825 1,430 1,410 1,405 1,715 1,735 1,705 861 858 850 701 702 711 751 744 733 1,910 ¹ 1,950 2,050 1,350 1,395 1,380 }	1,857	1,859	- 2
Cement Works ...		1,415	1,432	-17
Salt River Works ...		1,718	1,711	+7
N.E. Corner Cottages ...		856	852	+4
Chimney, Oude Moelen ...		705	686	+19
Valkenberg Asylum ...		743	749	- 6
Clarendon, Mowbray ...		2,000	1,994	+6
Chimney, Nieuwe Moelen...		1,375	1,388	-13

¹A violent gust of wind interfered with this observation.

On 7th February, 1902, I arrived at Beaufort West. I reported myself to General French and Major-General Stephenson; and was presented to Colonel Crabbe, Grenadier Guards, who invited me to spend a day at his camp, Rhenosterfontein, 20 miles off. I went there on 11th February, and the range-finder was tested against the service mekometer.

Distances of points varying from 970 to 3,000 yards were asked for. In each case I gave the distance before the two men using the mekometer had finished their most necessary consultation. Sometimes the ground was such that they could not stretch their 50-yard string at right angles to the line of sight. Sometimes the target could not be seen from both ends of their base. Sometimes the kopje whose distance was required had no sufficiently definite object for the two men to select for observation.

After directions of vision and subjects suitable for the mekometer were found, where the base could be extended, we determined the distances with both instruments. There were grave discrepancies. At last, when the mekometer gave 5,000 yards as the distance of a hill which I marked as 3,000 yards, I suggested to the colonel that his instrument was out of order. Then a new man was found for the right angle, and then their distance was 3,000 yards. After that all the distances agreed quite well with my range-finder. The great errors were due to one of the observers, and they would not have been known but for the range-finder.

This experience quite explained the remark frequently made to me in South Africa by those in charge of guns, viz., that if ever the mekometer were used they did not rely upon its indications.¹ It also explained the fact that neither the mekometer nor any other range-finder was ever used with rifle fire in the war. The War Office, I believe, asked for information from Lord Kitchener on these very points, and Lord Kitchener has been collecting the facts from column commanders. It is quite certain that within rifle range it would be intolerable for two men to parade about, not only exposing themselves, but also drawing the fire of the enemy on their comrades. It seems certain that when the British soldier is using a rifle, no instrument is ever used in actual warfare to tell him the distance.

In consequence of this want of a suitable range-finder, our men may be firing with the rifle for hours, hundreds of yards short of the enemy. Distance judging in a clear atmosphere is absolutely impossible if there be no objects near the target whose size is known. In a hazy atmosphere the amount of haze between a man shooting and the target is some guide. In a clear atmosphere practice will tell you how far off you can detect the shape of a man's hat or the markings on a stag. But without a known object no amount of practice enables you to tell the distance of a rock across an unseen valley.

¹ See extract from the *Broad Arrow* in Appendix H.

If the ground be sandy the shells from a pom-pom, or the rifle shots of a volley, may throw up the dust and show your error of distance. But if the ground be wet, or the enemy among rocks, you may shoot for hours without knowing where your shots are going.

If the distance be known correctly, bad shooting may be compensated for by multiplying the number of shots fired. But if the range be in error, the best shot has the least chance of hitting his mark.

After the trials of the range-finder against the mekometer, I was allowed to go with Colonel Crabbe's column as range-taker, and was instructed to wear khâki. The column included Guards' Mounted Infantry, Coldstream Guards, 16th Lancers, 104th Imperial Yeomanry, 74th Imperial Yeomanry, Brabant's Horse, two 15-pounders of the 88th Battery R.F.A., and a Maxim. The other columns engaged in the combined movement; and starting from different points, were commanded by Doran, Capper, Bentinck, and Lund, the whole under Major-General Stephenson, who was with Colonel Capper's column. I will now make extracts from my journal.

I joined Colonel Crabbe's column on 14th February. At daybreak on the 17th we left Rhenosterfontein, halted midday, and camped beyond Bastards Poort in the afternoon (trek 20 miles). I tested the zero of the binocular several times and found it quite stationary. At Beaufort West I had found it change a little, but 10 miles of galloping with the binocular rattling in its hard leather case had settled the parts in their bearings, and I never had any changes in the zero beyond two or three seconds of arc. I took some trouble to prevent the binocular being injured.

At the last part of our trek to-day Colonel Crabbe pointed out to me the scene of operations a fortnight ago. He was hemmed in by a large force of Boers and tried to rescue Major Crofton's donkey convoy, which, however, had already been captured. Colonel Crabbe's column was for three days in a very tight place. The result might have been serious had not Colonel Capper by luck heard the news and come to his assistance. Colonel Crabbe succeeded in holding at bay a force three or four times superior to his own in numbers. My single piece of bad luck in South Africa was arriving too late for this action. Everyone said afterwards that the range-finder would on that occasion have made all the difference in the world to the battle.

This evening, on arrival in camp, the colonel wanted from me the distances of all the kopjes around, to know where outposts were necessary. This was a precaution he took every evening. It was a practice to take the opinions of many officers as to distance, and then to test with the range-finder. This gave us most extraordinary results as to inaccurate judgment. In England the amount of haze between you and an object

is some sort of guide to distance, but in the clear air of the veldt there is no such guide. If you have no object whose size you can estimate, you have absolutely no means of judging. It is all very well to say that you learn with experience. The range-finder showed this to be a delusion. Men who had been out during the whole war, and who were accepted as authorities, were found to be absolutely at fault. I have found such a man say a kopje was 2,800 yards off when the range-finder showed it to be only 670 yards; or again he would say it was 500 yards when it was really 1,200 yards. A few hours later, in a different light he could see that he had been quite wrong. At evening, towards the west, the tendency was to give the distance far too great. With the sun behind you the estimated distance was often, but not invariably, too low.

18th February.—Reached Eyre's Kraal at 8 a.m., started again at noon with news of Boers ahead of us; reached Lapfontein early (trek 14 miles), found hundreds of donkeys and burnt wagons from the captured convoy, also much buried stores; captured some rebels. To-day, and every day, I tested the range-finder and always found its zero correct enough for distances up to 2,000 yards, and easily adjusted it for longer distances. The greatest correction I ever had to make to the binocular was equal to about 60 yards in 3,000 yards, and the base never needed any correction all the time I was with the column. I need not mention these tests again, which took place every day, nor will I again refer to distance taking for outpost duty, which was my daily work, nor to the errors of judging distances by eye, which also were a daily experience.

19th February.—In the morning fired a few shots at Boers, who had left Lapfontein a few hours before we reached it. Camped at Jurysfontein, having obtained further news of the Boers led by Botha.

20th February.—Passed the farm where Botha slept last night, soon we saw nine Boers on our right, who bolted when we fired. At 10.30 we approached Ganz Vlei River, a dry water course; Pyper's commando was raising a dust some miles from us and there was a race for the kopje in front. The 74th Imperial Yeomanry on the left got stopped at a donga and were heavily fired at, while the Boers were crossing the ridge in front they were shelled by us at 1,800 yards. The 16th Lancers went off on the left to charge the kopje in front, but the Boers were on the ridge, and as the Lancers approached a heavy fire was opened upon them and they retired; then we went on to the farm, and Colonel Crabbe having sent a troop of Guards' Mounted Infantry on to the kopje in front of the farm, he went on and the gunners watered the horses. Some Boers appearing on the sky-line, the guns were brought up and shells burst on the ridge among the Boers where the Lancers had charged.—I fear this is not a very intelligible account—it is taken verbatim from my notes; but my thoughts were entirely taken up with the work of taking ranges all the

time, and my account of the fight may be inaccurate, but my ranges were not, for it was generally admitted that the range-finder, on this its first day of heavy work, decidedly improved the shooting. At one time I gave ranges to the guns at 3,000 yards, which made excellent practice. To-day we camped at Paarda Gras (trek 33 miles) and learnt that the Boers had all crossed our front.

21st February.—In the morning we sighted the Boers, whom we disturbed at their breakfast in a farm-house. I gave ranges at 4,800 and 5,000 yards. We had a hard gallop some six miles, but they escaped, so we had to follow them up through a bleak rocky country to Speionberg, which we reached late; some half-dozen of the Boers whom we drove ahead were shot or captured by Bentinck's intelligence. It was a hard day for some of the men, as we were 24 hours without food, and yesterday had been the same. In the middle of the night our convoy arrived (trek 35 miles).

22nd February.—Reached Krasfontein (trek 19 miles) early. Most of our officers have spoken to me about range-finder to-day, believing it to be just what is wanted. They say that by its use the war would have reached its present stage at least a year ago.¹ They all wished it had been with them a fortnight before I joined them. So do I.

23rd February.—To Slingsbyfontein (trek 12 miles).

24th February.—Halted at Tabaksfontein on the Zak River (dry water course), and then on to Edwardsfontein (trek 31 miles).

25th February.—Recalled by General Stephenson after marching 4 miles. Reached Kleinestoefontein (trek 20 miles). Here we crossed Colonel Capper's column with General Stephenson going N.W.

26th February.—To Garra (trek 12 miles). Here we were on the blockhouse line, extending from Williston to Carnarvon, and Victoria West. Here our work ended, after nearly 300 miles of trekking; and on the 28th I left the column and travelled in Cape carts to Victoria West, and thence by rail to Beaufort West, and reported to General French.

During the whole time I was with the column the range-finder was slung on my saddle. At any halt, day or night, saddle, and range-finder attached, were left in the lines among the other saddles. No more care was taken of it than a rifle; once my horse rolled on it. The maximum displacement of the prisms ever observed was under one minute of arc, and 15 or 20 times as much would not have diminished the accuracy below my standard. It is now certain that, with the present construction, no adjustment of the base is ever required.

On the last day that I was in camp with the column, I was given a class to teach range-taking. In less than an hour they could all take

¹A direct saving to the country of £75,000,000.

ranges accurately, and also get the zero of the binocular set. Sergeant Saw, five minutes after beginning, could work it with far greater accuracy than myself. Practice had made me quicker; but good eyes could take the range quite accurately without practice. I confirmed this over and over again afterwards at Beaufort West and elsewhere. Here are Sergeant Saw's first five readings:—

Observation.					Yards.	Difference from Mean.
1	..	...	...	...	2,440	Yards. -6
2	...	...	...	...	2,450	+4
3	...	...	...	...	2,450	+4
4	...	...	...	...	2,430	-16
5	...	...	...	...	2,460	+14
Mean					2,446	

The maximum divergence from the mean, 16 yards, is an angle of seven-tenths of a second of arc, with a magnifying power on the binocular of 8. This is equal to $5\frac{1}{2}$ seconds with the naked eye. This was repeated equally well again. This shows the great accuracy of stereoscopic vision.

On my return to Beaufort West I taught men to use the range-finder. I never had a failure after I found the importance of telling them not to lay the balloon tail-rope *on* the target, but *above* it. Also, if the background of the tail-rope be not considerably more distant than the target, the balloon must be moved *slowly* up to the distance of the target, and never beyond. If the beginner, by turning the micrometer's *milled head*, moves the balloon too far away, he gets into trouble. Any soldier can learn to use the range-finder in an hour. Brains and education militate against the stereoscopic sense, which resembles instinct, and make the process slower. Good eyesight, and doing what he is told, without asking why, make a man a good range-taker in five minutes. Practice only increases the speed of taking ranges.

My own eyesight has been injured, yet I am generally certain of getting an accuracy of 2 per cent. in 3,000 yards—often much closer. This means the estimation of 30 seconds of arc with the naked eye. But I found men who could observe $5\frac{1}{2}$ seconds with the naked eye stereoscopically. Certainly picked gunners could always be found to get four times the accuracy I have aimed at. This means finding ranges of 6,000 yards with an accuracy of 60 yards. I believe, therefore, that without any change, the present type would be very useful with all our Horse and Field Artillery. But it can easily be altered for artillery.

Let me draw attention to another point. If I give the gunners a range as 4,500 yards, which may be, perhaps, 200 yards out, owing to the zero of the binocular not having been lately tested, then on the

first shot being fired I am still pointing the instrument to the spot. I see the shell burst, and in five seconds I can see how far the shot is short of or beyond the target. I tell the officer that his range should be increased 180 yards, and this ensures accuracy and corrects for error of zero; also for state of barometer, ammunition, etc. It abolishes and replaces the bracket system of sighting. Even if a mekometer were accurate, it cannot observe a cloud of smoke or of dust as this range-finder can.

The appendices to this lecture give description of, and suggestions for, manner of using the range-finder.

It will be interesting to conclude now with a summary of the results obtained by these practical tests in South Africa; and I also desire to record my thanks to all those officers and heads of departments who assisted me to secure this trial of the folding range-finder.

SUMMARY OF RESULTS ARRIVED AT BY MY VISIT TO SOUTH AFRICA IN 1902, TO TEST THE RANGE-FINDER FOR USE WITH RIFLES.

1. Distance judging is known to be very difficult, but the range-finder enabled me to find out, what few people know, that the most experienced and trusted of our officers who have been serving throughout the war, will sometimes give a distance as 2,800 yards when it is under 700 yards, and at other times will give a distance as 500 yards when it is over 1,200 yards.

2. There is no service range-finder ever used with infantry or cavalry in the field, and if the mekometer be ever used with artillery our officers seldom rely upon it. The time taken is excessive; the exposure of the men is objectionable; the errors introduced by two men dependent on each other are fatal; and the ground often does not admit of a mekometer being used. The new range-finder is not to replace the mekometer. It will replace nothing, because there is nothing to replace.

3. Our officers and our men in the field are unanimous in the opinion that the universally recognised want, which has often nullified the strategy of our leaders and the endurance of our men, and made us often helpless for offence before the enemy, was the want of a quick, handy, reliable, one man range-finder. The want has in every action reduced the casualties we inflicted to a fraction of what it should have been.

4. I have tested the range-finder for accuracy against the mekometer and against surveyed distances under most competent generals and others. Everyone agreed that its accuracy was all that could be desired.

5. As to speed, I could always give the range long before the two men occupied with the mekometer had concluded their preliminary consultation as to the exact point to be observed.

6. I have trekked with a column 300 miles in 11 days, the range-finder being always slung to my saddle. Each day I was at different times called on for distances. It never took one minute to dismount, set up the range-finder and give the first range, subsequent ranges being given in a few seconds.

7. I was in action two days and gave the ranges quickly and accurately, and undoubtedly improved the shooting.

8. No amount of jolting in long gallops ever put the range-finder out of order. It never needed adjustment of the prisms, though no more care was taken of it than of a rifle, and once my horse rolled on it.

9. Every officer who has seen the range-finder in use or in action has told me that, so far as he can judge from what he has seen, it is the very thing the Army needs.

10. These officers have described their experiences in scores of battles in which disaster would have been converted into victory, or a partial success into complete surrender of the enemy if my range-finders had been freely used, as they saw me use one in action.

11. Even among the troopers of our column, the range-finder was an object of keen interest, and when they saw its performance they agreed that it was just what they had been longing for.

12. I have instructed scores of officers, non-commissioned officers, and men in the use of this range-finder. I have not had a single failure. Many became better at its use in five minutes than I am. A day or two would suffice to make an accomplished range-taker of almost any man in our Army.

APPENDICES.

A.—EXPENSE OF INTRODUCING RANGE-FINDERS FOR USE WITH OUR INFANTRY.

I. Before starting for South Africa I expressed the belief that the use of the range-finder would double the effective power of an Army. Officers in South Africa thought I had underrated the effect. Officers in England think that I have overrated it. The moral effect may be taken as far greater than the effect in hits. The increase of prisoners will be even greater than the increase of killed and wounded. If the true estimate of the value of the range-finder be even one-tenth of what I suggest, the cost of furnishing the Army with it does not affect the question.

II. If three range-finders are supplied to every hundred men, and if they were to require renewal (which is impossible) once in ten years in

peace, and every five years in war, the cost to the country of each soldier would be increased from £100 a year to £100 6s. 8d. in time of peace, and from £200 a year to £200 13s. 4d. in time of war.

III. The third way of looking at it is this: If we cannot afford a few hundred thousand pounds to give our infantry plenty of range-finders, it will be difficult to prevent the Russians and French and Germans from increasing the fighting power of their Armies in this way. What are we then to do? Double our Army? Is it not better, as well as cheaper, to take the chance we now have of being first in the field?

B.—DESCRIPTION OF THE FOLDING RANGE-FINDER.

A general and popular account of this range-finder has appeared in the *Journal of the Society of Arts*, November, 1901.

The mathematical theory of the range-finder, and certified tests of accuracy, were communicated to the Royal Society.

It is proposed now, while exhibiting the range-finder, to give only such a technical description as is required by those who use it, and referring to the model used in South Africa.

The folding range-finder consists of two parts: the *base* and the binocular.

I. The *base* is a tube of rectangular section, 1 inch \times $1\frac{1}{4}$ inches, and is 6 feet 3 inches long. It consists of two *half bases* 3 feet \times 3 feet 3 inches long respectively, hinged together at the middle of the whole base; the hinge is at the top when opened out. On the left half-base, at the hinge, there is a vertical *slot* facing the range-taker, to receive the *tongue* of the binocular. On the two halves of the hinge, facing the range-taker, are the *middle openings* ($\frac{3}{4}$ inch square), closed and opened by the *middle shutters*, which expose to view the glass faces of the *middle prisms*, which are mounted in the tubular base.

At the two outer ends of the base are two cylindrical shutters called the *outer shutters*, which are opened or closed by rotating them about the axis of the base, and expose the glass faces of the two *outer prisms*, mounted in the tubular base. The distance between the centres of the outer prisms is 72 inches. These *outer prisms* face the target. The *middle prisms* face the range-taker. A rubber ring is attached to the longer half-base. When the base is folded, this rubber ring is passed also over the end of the shorter half-base to keep the two together. Each half-base has a wooden leg hinged to it, and kept in place when out of use by a rubber ring.

No adjustments of the base of any kind whatever need ever be made after leaving the maker's hands.

The base, when folded, is carried in a sling-case, with a folding-flap at the lower or hinged end, and a strap to fasten it.

II. The *binocular* consists of two telescopes, having two black ebonite *eye-caps*. The distance between these can be varied to suit different people by opening or closing the *binocular hinge* between the telescopes. Between the eye-caps is a horizontal rod, attached to the left telescope, sliding in a horizontal tube, attached to the right telescope. On the rod there is a *distance of eyes scale*, graduated from $2\frac{1}{4}$ to $2\frac{3}{4}$ inches, showing the distance between centres of eye-caps. The binocular hinge is gripped by a support with 6 *bolt-heads*, and this support ends in a flat *tongue*, pointing downwards, to slip into the *slot* on the *base-hinge*.

On looking through either telescope at the sky, a *balloon* is seen with *tail-rope* hanging down. The bottom of the tail-rope is at the middle of the field of view. There are really two balloons seen as one, by the two eyes; that one seen with the left eye has the letter *L* on its left side, and the one seen with the right eye has the letter *R* on its right side. Each eye-cap can be revolved to focus the telescope to suit each eye, and the *left focal scale* and *right focal scale* are marked for the focus of each eye, from +10 to -10 divisions. Behind the tongue is a clamp for securing the two telescopes at the right distance apart, called the *binocular-hinge clamp*. Above the left eye-cap there is a square pin, worked by a key, to raise or lower one balloon relatively to the other. On the right side of the binocular there is a drum-head carrying a dial on the right side, with a flat spiral *distance scale* registering the number of 100 yards, from 500 yards upwards. The scale is turned by the *milled-head*, 1 inch diameter. The scale is read by the *pointer* which moves along the spiral radially, to read successive revolutions. It is attached to the *cover* enclosing the drum-head. There is also a *pointer-clamp* for fixing the pointer in any position. On the left side of the dial is a *divided circle* divided into 100 parts, with a fixed pointer. On the *distance scale* beyond the 10,000-yard mark there is a mark ∞ for practically infinitely distant objects when the angle to be measured is zero. The reading on the divided circle when the pointer is at this mark, is called zero, or the infinity reading.

Fig. 1 shows the shape of the prisms, and the path of the two beams of light from the target entering the two outer prisms, suffering a double reflection at each prism, passing along the tubular base, passing through the middle prisms, and entering the binocular, parallel to their original direction

These two beams of light pass through the *object-glasses* *G G'* of the binocular, and form two images of the target at *I* and *I'*, on the line of the beam of light passing through the centre of the object-glass. These images are examined by eye-pieces *E*.

In Fig. 2, if T be the target, AA' the base, then II' are the images of the target. Draw Gi parallel to $G'I'$, then the moon or any other very distant object, if its left image were at I' , would have its right image at i , where $I'i = G'G$ the distance between the centres of the object-glasses. Here the two eyes look in parallel directions. But for the target T , which is nearer, the eyes must converge to look in directions $IG, I'G'$. The

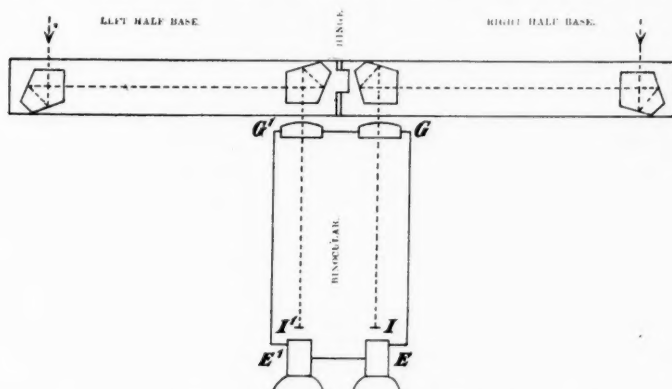


FIG. 1.—DIAGRAM SHOWING PATH OF LIGHT RAYS FROM TARGET.

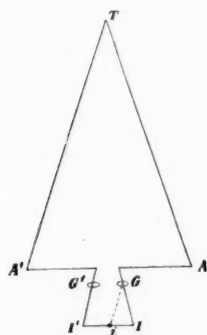


FIG. 2.

muscles of the eye tell us of the comparative effort required to converge the eyes, when two objects at different distances are seen at the same time. If two balloons photographed on glass be placed at I' and i , or at the distance $I'i$ apart, the balloons are seen as one balloon at the same distance as the moon. But if we are looking at the target, the balloon i

must be moved to I , to make the two balloons look like one balloon at the distance of the target. We measure this distance Ii by the drum-head which works a micrometer screw.

$$\text{Now } AT = \frac{GI}{Ii} \times AA'$$

$$\text{or distance of target} = \frac{GI}{Ii} \times \text{length of base.}$$

$$= \frac{GI}{Ii} \times 2 \text{ yards.}$$

$$\text{In my binocular } \frac{GI}{Ii} = \frac{810}{\text{number of revolutions of drumhead.}}$$

So for any distance of target D , we have to mark that distance on the spiral scale, when it and the micrometer screw have turned through a

$$\begin{aligned} \text{number of revolutions} &= \frac{810}{D} \times 2 \text{ yards} \\ &= \frac{1,620}{D} \text{ yards.} \end{aligned}$$

For 1,000 yards it is 1.620 revolutions. For 2,000 yards it is 0.810 revolutions, and so on.

In this way the graduations for different distances have been calculated.

C.—METHOD OF CARRYING THE EQUIPMENT.

I.—By a Mounted Man.

A mounted man attaches the strap of the sling-case of the base to two D 's on the near side of the saddle. He has another strap fixed to the D at the back of the saddle. He passes this round the upper part of the sling case and buckles it to keep it steady when trotting or galloping. He places the binocular in the left of the two wallets in front of the saddle.

On the order being given to take a range, the binocular is removed from the wallet. The man dismounts and drops the reins on the ground. He then takes out the base, puts the binocular *longue* through the base *slot*, straightens out the 6-foot base quietly not to injure the hinge, opens the four shutters, sits down facing the target, with the legs of the base gripped between the knees, and takes the distance of the target.

II.—By a Foot-Soldier.

A foot-soldier uses the same sling for the base as the mounted man. He passes the strap over the right shoulder and under the left arm, with the flap, and also the hinge of the base, downwards. The binocular is

carried in a leather binocular case with the strap passing over the left shoulder and under the right arm.

To take a range he goes through the same operations as the mounted man, except as regards the horse.

D.—TO DETERMINE THE RANGE-TAKER'S OPTICAL CONSTANTS.

Every man in the Army has his optical constants determined, and these are given to him on a card thus:—

$L - 1$
$R \ 0$
$D \ 66$

This means that the *Left focal scale* should, in this man's case, be at -1 ; the *Right focal scale* at 0 ; and the *Distance of eyes scale* at 66 divisions.

I. To find D . The *binocular hinge clamp* is loosened. The base is not used. The man grasps each telescope body with one hand. He points it to the sky and sees a balloon. He alternately opens out and closes in the telescopes by working the binocular hinge until he sees an R on the right side and an L on the left side of the balloon. He moves the hinge until he sees them most distinctly, when there should be an increased brightness of the picture. The *binocular hinge clamp* is then made tight and the distance D read off on the distance of eyes scale.

II. To find L . The observer again looks at the sky, and sees the balloon. Revolving the left eye-cap to right or left, the letter L becomes more or less distinct. When most sharp L is read off on the left focal scale.

III. To find R . The same operation is performed, except that the right eye-cap is revolved until R is quite sharp. Then R is read off on the right focal scale.

E.—TO TAKE A RANGE.

Directing the binocular and base towards the target and looking through the binocular, a man is virtually seeing the target by means of eyes placed at the two ends of the base, 6 feet apart. He can then judge the relative distances of objects. He also sees a balloon at some distance. He lays the tail-rope of the balloon just above the target, and not, on any account, on it. He notes that he sees both R and L on the balloon, else he is using only one eye and cannot work. Then, by twisting the milled head one way or the other, he moves the balloon away from him, or brings it nearer to him. He should begin with the balloon nearer than

the target (by setting the distance scale to 500 yards) and watch the balloon going away as he turns the milled head, always keeping the tail-rope above, and never on, the target. He stops turning when the balloon is over the target, and then he reads the distance on the scale in hundreds of yards.

F.—TO SET THE ZERO.

When a range-taker starts using a binocular, which he has not been the last to use, he must first set the zero.

1. He sets the *focal scales* and the *distance of eyes scale* to the numbers on his card. If he has lost his card and cannot remember the numbers, he must reset them by trial as explained already.

2. He then slips the *tongue* of the binocular into the *slot* of the base, and looks to see if the object-glasses are both at the same height as the middle prisms. If he finds it necessary to twist the binocular about its hinge, the 6 bolt-heads may be loosened to enable him to do this.

3. Next, taking the binocular off the base, he observes any distinct object of unknown distance somewhere between 500 and 1,000 yards. He sets the balloon over the target, and reads off on the divided circle. He does this five times and takes the mean, and sets the divided circle to this mean.

4. The pointer-clamp is then loosened, and the drum-head cover is turned until the *pointer* on the *distance scale* reads ∞ . The pointer-clamp is then tightened.

5. The binocular and base are now used on the same object, and five readings taken on the divided circle, and the circle is set to the mean reading. The distance on the scale is now read, and $\frac{1}{30}$ th subtracted to give the true distance. The pointer-clamp is loosened, and the pointer turned to point to the true distance. The pointer-clamp is tightened, and the scale reading will now be correct for all distances.¹

G.—SUGGESTED REGULATIONS FOR INFANTRY.

1. Every man in the Army should at least, once a year, have a course with the range-finder lasting one day.

2. The present course of distance judging to be abolished.

3. Every section of every company of infantry, whether mounted or on foot, to be supplied with a range-finder.

4. Ten men in each company to be selected to act as range-takers for the day, or to replace range-takers who are disabled.

These suggestions are thrown out, with all modesty, the result of discussions in South Africa, merely as a preliminary basis for discussion.

¹ There are many methods available to set the zero. The method described works well in practice.

H.—EXTRACT FROM THE *Broad Arrow*, FEBRUARY 22ND, 1902.

"The War Office has issued Col. F. Eustace's report as Commandant of the Camp at Okehampton, on the practice carried out last year by upwards of nine brigade divisions of Horse and Field Artillery. * * * 28 batteries in all practised.

* * * * *

"Last year the average ranges for 28 batteries at standing targets were:—

	Yards.
Twelve 15-pounder B.L.	2,648
Nine 15-pounder Q.F. and one 12-pounder B.L.	3,209
Six 5-inch Howitzer	3,170

* * * * *

"Range-takers were very unsatisfactory. For them to be 1,000 yards out, Col. Eustace states, was nothing unusual.

"Out of 127 ranges taken, 66 were complete failures."

The CHAIRMAN (General John Hart Dunne):—I am sure we have all heard this clear lecture with a great amount of pleasure. I should like to ask the lecturer what is the weight and what is the cost of his instrument.

Professor FORBES:—It weighs 6 lbs. With regard to the cost, it is difficult to say at present, because I do not know the conditions under which it is going to be manufactured. The question is, whether the War Office would wish to make it themselves, or whether they would wish to make contracts with firms to make them. At the present time to make individual instruments is certainly a great deal more expensive than it would be if made in quantities for the Army. At the present time the cost of the instrument is about £100.

The CHAIRMAN:—Is it by calculating that the instrument costs £100 that you estimate that three range-finders supplied to every 100 men would raise the cost of each man per annum from £100 a year to £100 6s. 8d.?

Professor FORBES:—Yes. Three range-finders would be supplied to every 100 men once every ten years. That would mean there would be a cost of £30 per year for every 100 men, which is 6s. 8d. for each man.

The CHAIRMAN:—Do you think that one of those light instruments, which would be carried about and perpetually used, would last for ten years?

Professor FORBES:—Certainly, in times of peace. It will last as long as a rifle, and is no more liable to get out of order than a rifle.

The CHAIRMAN:—It seems to me from my many years' experience of Tommy Atkins that you take a most wonderful view of him if you think you can make him a perfect range-finder.

Professor FORBES:—Not perfect—I would like to retract that word—but I would say you could make him an accomplished range-finder in a day or two. As far as eyesight is concerned, the great result I have acquired from my experience in South Africa is that this is not a scientific instrument, but a tool; that I can leave it about exactly as a rifle is left about. It can be knocked about as much as you please, and yet it never gets out of order.

The CHAIRMAN :—It strikes me it would be necessary to have a scientific man perpetually employed in charge of these range-finders—a man who understood them and could mend them. With regard to what you say as to the soldier becoming a good range-finder, I suppose he merely becomes a sort of automaton?

Professor FORBES :—That is all he is wanted to be.

The CHAIRMAN :—The less he knows the better; but you must have someone to put the instruments to rights when they are injured?

Professor FORBES :—No, they will not get out of order. If the binocular gets out of order you send it back to the maker to be repaired, just as you send a mekometer.

The CHAIRMAN :—I commanded a battalion in the year 1864, when there was no way down from Pietermaritzburg to the coast except by wagon, and goodness knows where we should have had to send a range-finder to get it repaired.

Professor FORBES :—But you would have had three to the company.

The CHAIRMAN :—But when would you have had this one repaired?

Professor FORBES :—When you had the chance. How do you repair the mekometers?

The CHAIRMAN :—I do not know much about them.

Professor FORBES :—You would get them repaired exactly in the same way as you get the mekometers repaired.

The CHAIRMAN :—In these out-of-the-way places how would you get them repaired unless there was a professional man on the spot?

Professor FORBES :—They will not require repair.

The CHAIRMAN :—Not if you drop them down?

Professor FORBES :—I should be very glad to drop this instrument down and take a range immediately afterwards; in fact, my horse rolled on the instrument.

The CHAIRMAN :—I have had a horse roll on me and have not broken my ribs!

Major-General E. R. FESTING, C.B., F.R.S. (Director of Science Museum, South Kensington):—There is just one point that occurs to me. I should imagine that naturally the joint is a source of weakness. In adjusting for zero, would that make up for any little inaccuracy of the instrument at the joint?

Professor FORBES :—The arms or any part of the instrument might be completely out of order, but the instrument is still accurate. If you have a mountain five miles off I should test the instrument for zero on that mountain. I should set it on to that mountain, read it off, and that ought to be infinity.

Major-General FESTING :—If the joint gets a little loose does it make any difference?

Professor FORBES :—Absolutely none; I have written a paper for the Royal Society chiefly on that very point. A great many most competent people have raised that point. I have had to go into the mathematics of the subject, and I have demonstrated quite clearly to everybody that this part does not need to be absolutely correct. As long as you see the two lines at the same time, it does not matter about the other part.

Major-General FESTING :—With regard to the extra 6s. 8d., it seems to me that the cost of the instrument is almost comparable to a rifle, at all events it is comparable

to the price of twenty rifles, and certainly very much less than the price of a good piece of artillery. I think one may fairly say it is not so much the cost of the man, but an instrument of this kind if it is successful most certainly increases the value of each rifle tenfold, and of each gun probably twentyfold. This is the great question. I do not think the 6s. 8d. is of much account. You can do as much with an instrument of that sort with five men as you could with fifty men without it.

The CHAIRMAN :—I am sure you will all agree with me that we are most indebted to Professor Forbes for his clear account of the absolutely wonderful effects of this range-finder. I deeply regret that that old friend of mine, a most zealous soldier, Colonel Crabbe, is not here. If I might do so, I would suggest it would be a very good thing, if this blessed war is ever over—we hope it soon will be—if this lecture could be repeated here before a large audience of practical soldiers who have during this Boer campaign had a thorough experience of the value of range-finding in that most puzzling of countries as regards distances, South Africa. I had five years' experience of the country long before this present war. We all must feel, after what has been said in the newspapers and what Sir Redvers Buller and other people have written, the difficulties of the atmosphere and climate out there. This is a most wonderful instrument, and it is much more likely that it would be taken up by the Government if a meeting could be held hereafter, when the war is over, when we can be sure of a large assemblage of men who have fought on the veldt, who know the conditions of warfare, and have the whole subject, which has been so ably expounded to us this afternoon, thrashed out. At the present time there are very few soldiers at home except those on leave, and those mostly are visiting their friends or are tired of listening to stories of the war or anything connected with it. I am sure we thank the lecturer very much, and Lord Roberts, when he reads the lecture, will, I am sure, deeply appreciate the value of getting an accurate range-finder. Those of us who have had experience of war in olden days remember the extraordinarily bad shots that used to be made. At the Sedan it is simply marvellous the number of shots that either touched the place or went over. Another friend of mine, Sir John Arlagh, whose opinion I would as soon take as any man's in the world connected with these things, I see has expressed his approval of this range-finder. I notice in the paper that Professor Forbes at Capetown got a range with an inaccuracy of 2 per cent. at 3,000 yards. You know that with our present arrangements you would probably have to make 60 or 80 shots before you get anything like a range. Unfortunately it is so long a time since I was in the command of infantry that I do not know much about Professor Forbes' opponent—the mekometer.

Professor FORBES :—It is not an opponent ; it does not do the same thing.

The CHAIRMAN :—The one little point I have raised I think is an important one, namely, that you will always have to have somebody to look after the instrument ; they cannot be left in the companies. However, I am sure you will all give a very hearty vote of thanks to Professor Forbes, who has shown a most patriotic spirit in going out and risking his life in order to test his range-finder. I enquired a minute ago, and he told me that luckily, if anything had happened, he would not have left a widow ; but I think it was a very plucky and patriotic thing to go all the way out to South Africa at the risk of being potted by Boers, just for the sake of doing a benefit to his country in trying his invention.

ANCHORS: OLD FORMS AND RECENT DEVELOPMENTS.

*By Captain ANTHONY S. THOMSON, C.B.,
Elder Brother of Trinity House, Commander R.N.R.*

Wednesday, 11th June, 1902.

Admiral Sir N. BOWDEN-SMITH, K.C.B., in the Chair.

THERE is little reliable information about the anchors used in ancient days. As much mystery and confusion seem to exist in regard to the anchors of old time as attach to the arrangements by which vessels were in former days propelled by oars, in tiers one above the other. The reason in either case is perhaps that the historians were but slightly acquainted with the technical details, and unable therefore to transmit clear and intelligible accounts. It may be also that vessels, in the very early days of navigation, were less dependent on anchors than was the case in later times, the general practice which then obtained being to beach their vessels when unable to moor to the shore. It is certain however that the anchors used by the Phœnicians were made of wood, weighted with stones and later on with lead. There is no record that the Egyptians used any form of hooked anchor. The invention of the anchor proper is ascribed by Pliny to the Tuscans, but still without a stock and having only one arm. The anchors used by the Normans even do not appear to have been furnished with stocks. Time need not be taken up in attempting to trace the evolution of the anchor from ancient days; it will suffice at the outset to indicate certain stages in development which appear likely to assist us when considering the functions of the different parts, and the value of recent modifications.

In the first place, then, it is interesting to note that the earliest iron anchors were without a stock and that they had only one arm or fluke.

They were in fact mooring anchors as we have them to-day, and for such purposes quite efficient. Anchors of this kind, however, must have been chiefly useful for mooring vessels to the shore or to banks which occasionally uncovered. To make such anchors automatic, so to speak, it was necessary to provide three or more arms; hence the grapnel, a very old form of anchor.

Grapnel.—Grapnels are ill-adapted for penetration into the ground, and are prone to roll over on hard bottoms, their holding power being always slight in comparison to weight.

Mushroom.—From the grapnel to the mushroom is only a step in development, though the latter type is of comparatively recent origin. The bad points of the grapnel are accentuated in the mushroom, yet to the credit of the mushroom must be placed two very good qualities. Owing to its large surface and concavity the mushroom head is able to arrest moving particles at the sea bottom, and so produce an accumulation of sand or gravel under which it lies deeply buried. This property, technically called "sanding up," is a valuable one, but it is not available in cases of temporary anchorage. Mushrooms are not trustworthy anchors on hard bottoms, nor indeed are they to be recommended anywhere unless there is a reasonable certainty of their being sanded up. Another good point for the mushroom consists in its immunity from fouling by the cable. For this reason it was formerly always used for lightship moorings, and it is still the best anchor for telegraph buoys in deep water. It may be of interest to state here that whenever overhand or figure-of-eight knots have been found in the cables of lightships, this curious state of things has always occurred when a mushroom has been in use, and it may be accounted for by the bite of the chain working its way under the rounded mushroom head.

Ordinary Stocked Anchor.—The ordinary two-fluked stocked anchor seems to have been gradually evolved under the stimulus of necessity, and was probably first brought into general use by the Dutch. The stock, or wooden portion, as the name implies, may have been at first a mere stick passed through a hole in the end of the shank, as is sometimes the case with small boat anchors at the present day. The stock was originally provided simply to cant the anchor and to compel the arms to take up a vertical position so that the lower one of the two would bite into the ground. Even in later days, when fitted to the largest anchors, stocks were always constructed and arranged with a view to lightness rather than for strength, and intended to cant and keep the arms up to their work rather than to increase the holding power.

The Anchor up to beginning of last century.—Ships' anchors in general use up to the commencement of the last century consisted of a long round

iron shank, having two comparatively short and nearly straight arms or flukes inclined to the shank at an angle of about 50° and meeting it in a somewhat sharp point at the crown. The stock was generally a little longer than the shank and in the large anchors consisted of two beams of oak placed side by side, the shank end passing between them. A space of from one to two inches was left between the beams to admit of tightening them on the shank by hoops of iron. The surface of stock next the ring was generally straight, but always tapered away on the other side, towards the ends. This tapering of the stock on the inner side must, I think, have been intended to lessen the risk of the hempen cable catching under one arm of the stock and causing the anchor to come up foul, although I have nowhere seen it so stated. In the earlier anchors, indeed, the arms of the stock were bent backwards so as to make obtuse angles with the shank. In addition to their proper function for canting the anchor, the bulky wooden stocks of former days also served to ensure the anchor sinking crown first. When let go with way on the vessel, the great resistance offered by the stock must have been conducive to the anchor taking up a proper position for biting even before it reached the bottom.

It is quite otherwise with iron stocks, which offer comparatively slight resistance in the water when sinking to the bottom. Indeed it often happens that the iron stock sinks end on and sticks upright in a stiff bottom while the arms lie prone and useless. In such cases the vessel rides to the stock alone, and if the pull on the cable be sufficient to bend or break the stock, serious risks result. This may be the reason for the practice which I am told obtains in Chinese junks, of lashing beams of wood along the iron stocks of their anchors. It may be of interest to note here that in some early wooden anchors the stock is depicted as being secured to the shank only a very short distance from the crown, and this is essentially the principle of the modern anchor, where the cross-head takes the place of the stock.

About the year 1800 the shanks of large anchors were of composite manufacture. Four square iron bars of large cross section were placed together for the centre, and then surrounded faggotwise with smaller rods, some 70 or 80 pieces in all. This bundle of iron was then hammered at welding heat into a more or less homogeneous state by a mass of iron weighing about 5 cwt., which was dropped on the weld from a height of nearly 10 feet. This form of hammer was called a Hercules. Anchors were expensive items in those days, a 90-cwt. anchor costing about £415. The dimensions of an 80-cwt. anchor about the year 1800 were roughly as follows:—Shank $19\frac{1}{2}$ feet, stock 21 feet, and 12 feet across from pea to pea. Such an anchor would have large broad palms occupying nearly half the length of the arm.

About the commencement of last century, a clerk in Plymouth naval yard, Pering by name, suggested and carried out certain improvements, the most important of which was making the arms curved instead of straight. At first sight this simple change may seem of little value, but consideration will show that this is not the case. The holding power of an anchor depends on two principal conditions, namely, the extent of useful holding surface, and the amount of vertical penetration. The latter quality is necessary on account of the nature of ordinary sea bottoms, the surface layers of which are generally less tenacious and resisting than is the ground a short distance below. Now the measure of penetration, and also, to a limited degree, that of useful holding surface, is the vertical distance from the lower portion of shank to the pea, or extreme end of the arm, when fully buried. This distance depends on the length and on the inclination of the arm to the shank. Some inclination the arm must have, in order to bring about penetration; yet the more at right angles to the shank, the greater the penetration. These two opposing conditions are reconciled by curving the arm to the arc of a circle having its centre in the shank. Two minor advantages also accrue. During the process of tripping or breaking out the anchor, the buried arm continues its curved path in the ground until the shank is nearly vertical, and the pea ready to emerge with the least possible resistance. The old-fashioned straight arm, on the other hand, continued to offer resistance in the ground until the leverage derived from the effective length of shank became very much reduced. Again, with straight arms there exists considerable resistance to penetration, because the entire anchor must move longitudinally before the arm can bury itself; but with curved arms, the weight alone of shank and upper arm suffices to bury the anchor, in soft bottoms, without longitudinal displacement. This last consideration, which has some bearing in the case of modern stockless anchors with two flat blades, will be again referred to when dealing with the Martin's type of anchor.

Subsequent Improvements.—In the year 1831, chain cables began to supersede the hempen ones, with the result that the long-shanked anchors hitherto in vogue were no longer necessary, and anchors with shorter shanks and with heavier and stronger crowns gradually came into use. In consequence of these changes, a Commission was appointed, in the year 1838, to enquire into the holding power of anchors, and a principal result of their labours was the adoption of the so-called Admiralty pattern anchor, which continued to be used in the Navy up to 1860. The invention of the steam hammer in 1842 made the forging of heavy masses of iron a comparatively easy and reliable process, so that from this time onwards the strength of anchors fully kept pace with that of the chain cables which had come into general use. A great number of

patents for anchors were taken out prior to the Great Exhibition of 1851, and public attention having been called to the models there shown, in the following year a committee was appointed by the Admiralty to report on the qualifications of anchors of the various kinds. Practical trials were then instituted, and as a result Trotman's anchor took the highest place out of eight competitors, Rodger's anchor being second on the list. Some of the tests to which the anchors were submitted were of doubtful value, such for instance, as "facility for sweeping." Nowadays, at all events for deep ships in shallow harbours, it is considered an advantage for an anchor to offer as little obstruction as possible above the ground. In this particular test, as also in some others of small importance, Trotman's anchor was handicapped as against those of ordinary form, yet it came out first, owing to its undoubted superiority in holding power.

We may now proceed to consider the structure and qualities of the two anchors last mentioned, which may be taken as types of the best stock dependent anchors. This phrase is used advisedly, so as to exclude for the present certain modern forms falling between the designations "stocked" and "stockless."

Rodger's Anchor.—Rodger's anchor, dating back to about 1830, is named after the designer, Captain Rodgers, R.N., who, for forty years or more, devoted much attention to the subject of anchors, taking out many patents. This anchor, which, in its present improved form, has been in use for many years, is generally acknowledged the best of ordinary shaped anchors. It is made of iron of square section, possessing great strength in shank and crown. The palms were at first made comparatively small to ensure good penetration, but nowadays they are made somewhat larger. Mr. Richard Green, of Blackwall fame, in giving evidence before a Select Committee in 1860, said, "he preferred Rodger's original anchor on the whole, because it had very small palms, the crown going right into the ground. They did not make such a large hole and disturb the ground so much as broad-palmed anchors." We see the importance which this gentleman attached to good penetration without undue disturbance of the ground.

Trotman's Anchor.—The anchor generally known as Trotman's is the first and best of the so-called "patent" anchors, *i.e.*, anchors which depart from the ordinary type. It is an improvement on the earlier Honiball, better known as Porter's. The original, under the designation of the "Tumbling Fluke Anchor," was the invention of Lieutenant Belcher, R.N., in 1818. The anchor is forged in two separate parts, the arms and the shank, and the two connected by means of a pin passing through a fork at the end of the shank into which the crown fits. The crown and arms pivot on this pin, so that, when the anchor bites, the

lower arm enters the ground, while the other arm bears against the upper side of the shank. In this way great penetration is obtained, with a corresponding increase of holding power. During the repeated trials to which this anchor was at first subjected, the only important defect noticed was failure at times to bite quickly; that is to say, when the lower arm became jammed between the ground and the shank, the anchor occasionally failed to open out and bite, or dragged some distance before doing so. This defect was subsequently remedied by John Trotman, Esq., who added supplementary canting palms, which caused the anchor to bite readily. These supplementary palms, however, are not unmixed blessings; they make fouling by the cable possible, while they tend to lessen penetration and to break up the ground; they also offer considerable resistance to quick tripping, as is shown by the results of the Admiralty trials in 1852, when for quick tripping a proportion of 7 was awarded to Porter's as against 3 to Trotman's, the average value for the eight competing anchors being about 6. The weak points of this otherwise excellent anchor are to be found, of course, in the pivot and forked shank, especially when used on hard or rocky bottoms; but I believe breakages due to failure of these portions have seldom occurred when the anchors have been properly looked after. Notwithstanding its good qualities, this type of anchor is becoming practically obsolete, owing principally to the altered conditions under which anchors have now to be used. With the advent of bluff-bowed, wall-sided vessels and straight stems, these anchors were found inconvenient to cat, the long open arm being likely to hook under or across the stem. They are also somewhat difficult to handle in case of coming up foul, owing to the tendency of the arms to cant over at awkward times, during the process of clearing the chain.

Martin's Anchor.—We now come to the type of anchor found more convenient for ordinary modern requirements, where the stock serves only as an auxiliary, or is altogether dispensed with. The first anchor of this kind, invented by a Frenchman named Martin, about the year 1865, was found to possess distinct and important advantages over most of its predecessors, and still retains a foremost position. It is interesting, however, to note, that from this time forward, owing to the rapid increase of steam propulsion, more and more importance was given to convenience of handling and stowage, qualities which are in evidence only when the anchor is idle, so to speak, rather than to good points afforded by the anchor when fulfilling its proper function of holding into the ground. Thus, the great feature of Martin's anchor is the small space it occupies when stowed; it is short, narrow, and lies flat. In common with Trotman's anchor, it is without a weld, being forged in two principal parts, but Martin's anchor has the greater strength in the crown. In

construction it is simplicity itself; a solid round bar having the palms already forged, and one arm bent to shape, is passed through a hole in the shank head, the straight arm being afterwards bent and forged to the required form. The short auxiliary stock is then fitted on the ring end of the square shank and keyed to its place. The stock, which is really unnecessary, this anchor being self-canting, is set on the shank edge up and bent away from the flukes on either side; it was probably intended as an addition to the useful holding surface, rather than as a stock proper, the function of which is to cant and keep the arms up to their work. The shape of the stock in Martin's anchor is similar to that of stocks in some of the oldest anchors, but the intention seems to have been to increase the leverage of the stock for keeping the shank down, and also to give better holding, rather than to facilitate the cable clearing itself, as we have suggested was the intention of the anchor-makers of old. As against great strength, close stowing and self-canting qualities, we must set a few faults, which, however, only in a very slight degree detracts from the great value of this well-known anchor. The most serious defects seem to be insufficient penetration, absence of vertical curvature in the arms, and a too general distribution of weight. The weight of an anchor should be concentrated as far as possible in the crown and arms, as provided for in Lloyd's Register's rules, which now require the heads of stockless anchors to be not less than three-fifths of the total weight. These anchors are also rather difficult to trip out of hard ground, owing to the long flat palms and small shank leverage. The form of stock too offers a certain resistance to biting, because, to obtain complete penetration, the anchor must move about half its own length, and this, the stock tends to prevent. On hard bottoms, therefore, there is a tendency to hold only by the tips of the palms and by the lower edge of the stock; and in soft bottoms, the anchor may break up the surface ground and drag, rather than penetrate to the harder layers below. Martin's anchors are generally used in the ships of the Royal Navy, where low flat stowage and economy of space are all-important; they are also very suitable for securing on inclined anchor beds, or for being stowed vertically against the ship's side as is now the ordinary practice in large war-vessels.

Since the above was written, I have received from Messrs. H. Charlton & Co., of Gateshead-on-Tyne, the following account of the Martin's anchors, which is so interesting and instructive that very little apology is needed for quoting it almost verbatim.

The first Martin's anchor was patented 6th May, 1864 (No. 1154), by Mr. François Martin, and it is of interest to note that it was provided with a centre trip, fixed securely to the arms, this would assist the palms in tripping promptly as well as holding more securely, a principle which

is now adopted in most patent anchors. There is no record of many of these anchors having been made, they would require rather more fitting up than was desirable, and possibly their cost was to some extent prohibitive; at any rate, we find that on the 21st October, 1864, Mr. F. Martin patented a second anchor (No. 2604), and in one opening paragraph of this patent specification Mr. Martin says: "Part of my present improvements are intended to simplify, and thus facilitate, the construction of such anchors, thereby reducing the cost of manufacture"; and from the tone of the following paragraphs we gather that his first designed anchor held so well that there had been difficulty in breaking it out of the ground, and that he now dispenses with the centre trip—which in later patents is again adopted—and substitutes the form of anchor shank so well known in Martin's patent self-canting anchors.

This anchor was adopted by the British Admiralty, and in 1865 H.M.S. "Vixen," "Viper," and "Favourite" were fitted with them, followed in later years by the "Industry," "Pallas," "Prince Albert," "Glatton," "Devastation," "Thunderer," "Hecate," "Gorgon," "Cyclops," "Hydra," "Rover," "Rupert," etc.

This patent was improved upon and a new patent secured for the same by Claud and Hyppolite Martin, dated 30th May, 1872 (No. 1632); this improvement being the adoption of a pin through the head of the shank, penetrating the arms, which had a corresponding slot of sufficient length to allow the arms to travel to their correct angle on either side of the shank. These anchors were fitted to H.M.S. "Colossus," "Edinburgh," etc., being extensively used in H.M. Navy as well as by most foreign Governments, shipowners, etc.

On 10th May, 1882, Mr. Claud Martin was granted another patent (No. 2197) on a further improvement in this anchor, when the centre trip was again resorted to as a means of assisting the palms in holding and biting quickly. This was accomplished in one design by fitting plates on either side of the head of the shank, blocks being fitted between them on either side. Mr. Martin died soon after, and this patent was improved upon and repatented by Mr. Barton—who had assisted Mr. Martin in his work—on the 7th December, 1883 (No. 5663), the shape of the side plates and blocks being improved, but the principle was the same as in Mr. Martin's last patent.

In 1885 a limited company was formed to work the Martin's patents, who adopted the style of the Improved Martin's Anchor Co., Ltd. Mr. Martin's older patents were known as Martin's Patent Self-canting Anchor, but the new form now introduced was called the Improved Martin's Patent Anchor, so as to distinguish it from the older patterns.

In 1885 also, the Admiralty carried out an exhaustive series of trials with anchors, and on this occasion the Improved Martin's Patent Anchor

gave excellent results, and was adopted by the Admiralty for their ships, many of the older Martin's self-canting anchors being converted into the newer form. These anchors were fitted to a great many of H.M. ships, amongst which, were H.M.S. "Royal Sovereign," "Hood," "Repulse," "Ramillies," "Resolution," "Revenge," "Blake," "Blenheim," "Pique," "Terpsichore," "Thetis," "Hewe," "Collingwood," "St. George," etc., etc. They were also extensively used in many foreign Navies.

In 1893 the introduction of cast steel into the manufacture of anchors made it possible for the Martin's anchor to be still further improved and a patent (No. 5606) was granted to Mr. Henry Charlton for a new form of anchor head made of cast steel; the main features of the older patent were retained, but the manufacture was simplified so that an equally effective anchor was secured at a much cheaper rate. This anchor has also been fitted to a large number of H.M. ships including the new battle-ships "Duncan," "Cornwallis," "Exmouth," "Russell," "Leviathan," "Good Hope," "King Alfred," "Bedford," etc., etc. It is also extensively used in foreign Navies.

This anchor is known as the Improved Martin's Patent Anchor *Adelphi Pattern*, the words *Adelphi Pattern* being added to distinguish it from the former pattern.

Stockless Anchors.—Stockless anchors of modern type were first introduced about the year 1893, when cast steel began to be available for their manufacture. They are all modifications, more or less, of Martin's self-canting principle, though differing considerably in construction and detail. The shank, which is generally made light and taper, serves merely as a lever for tripping and for housing the anchor. The cross-head carrying the arms and canting pieces is a solid casting, so that these anchors consist practically of two principal parts. The shank is secured to the head in different ways according to the particular make of the anchor. Sometimes, as in the case of Byers' anchor, a long pin or bolt is employed going right through the head and riveted outside at the two ends. In other patents short pivot lugs are cast on the crown end of the shank, which is then entered through the crown from the back and the pivots secured in their place by keep bolts through the head. This is the method adopted in Hall's anchors. In the "Britannia" anchor the crown end of the shank is fastened to a ball which works in a ball socket in the head, the shank being entered from the back and kept in place by plate and cotter. In all cases the play or canting angle of shank is limited to about 90°, giving the blades an opening of 45° either way. The blades, which are necessarily straight in the vertical plane, generally project at right angles from the cross-head or parallel to the shank, but in some patterns they form a continuous curve in the plane of the cross-

head. Perhaps the most important differences in the various anchors are to be found in the means employed to ensure the arms canting downwards in order to bite when a pull is brought on the anchor. In some patterns the head almost approaches the mushroom form and so makes the addition of tripping pieces of minor importance; but in other cross-heads, designed to offer as little resistance as possible to penetration, large canting pieces or trips are provided. These are placed by some makers in the centre of the crown and by others at the outer ends of the cross head at the back of the arms. The latter principle seems the better of two, for when a central trip is employed there is a tendency for the anchor head to balance on it and roll, especially on hard ground. It is a pity that tripping pieces are necessary at all, because they tend to lessen penetration and do not always behave exactly as they ought in other ways. One of the causes of failure of stockless anchors to hold in certain bottoms may be traced to the tripping pieces. The tendency for a stockless anchor is to fall on the bottom with blades up, and supposing the head to sink at first deeply into soft ground, the effect of the trips may sometimes be to retain the blades in this useless position. Such, I believe, is the opinion of Mr. Lennox, of the well-known firm of Messrs. Brown and Lennox.

There are to-day many patented stockless anchors in more or less general use, each of which is supposed to possess its own special merits. The only one of which I have had practical experience is the Wasteney-Smith, one of the earliest cast-steel anchors. When in command of telegraph cable-ships I had opportunities for thoroughly testing this anchor, during a series of voyages commencing in 1884, with very good results, its performance comparing favourably with that of a Rodger's anchor of about equal weight. The anchor is, in my opinion, well designed, the arms and cross-head offering little resistance to penetration, while the horns, which serve as trips or canting pieces, are wide apart, so as to effectively steady the anchor and prevent rolling. The shank is connected to the head by a short strong pin, easily accessible. I am informed by the makers that upwards of 4,000 of these anchors are now in use, some up to 7 tons weight now being made for the Cunard liners and for mooring purposes in the Mersey. I was interested to find this anchor gave an excellent account of itself during the trials carried out by the Admiralty at Spithead, in March, 1900, with the object of testing the holding power and efficiency of stockless anchors. In these trials stockless anchors by different makers were separately let go from H.M.S. "Hero" in eight fathoms, mud bottom. Sixty fathoms of chain cable were veered away in each case, the ship's engines being then worked astern and power gradually increased to endeavour to break out or drag the anchors. Under these circumstances, one or two of the anchors

refused to budge, even when the engines worked at 80 revolutions, developing upwards of 3,000-H.P., the utmost available. These trials, though of a very thorough and practical nature, can scarcely be taken as conclusive for comparisons of the different anchors, yet they serve to prove the value and reliability of stockless anchors of approved construction. As a result of these and further trials, the Admiralty have adopted hawse-stowing anchors for some of their largest ships.

Hawse-Stowing Anchors.—For a long time stockless anchors were generally distrusted by seamen, and to this day the question of their holding power forms an ever-present subject of controversy. The fact that they are now usually supplied to new vessels is due, in a measure, to their undoubted merit; but also, in a much greater degree, to the modern hawse-stowing arrangement which the abolition of the stock has made possible. Indeed the advantages of being able to heave the anchor right up into a specially contrived hawse pipe are so manifest, that the adoption of this system has practically settled a vexed question, and has brought stockless anchors into general use much more quickly than would otherwise have been the case.

To Messrs. G. Tyzack, of South Shields, belongs the credit of having originated the hawse-stowing system. In the year 1884 a new steamship, the "Albano" of 3,300 tons dead weight, was fitted with one of their single-fluked anchors heaving up into a specially shaped wrought-iron hawse pipe. This anchor was practically the same as the single-fluked stocked anchor brought out by Messrs. Tyzack in 1877, but to enable it to stow in the hawse the stock was now shifted from the ring end of the shaft to the crown, passing through the forked shank and forming the pivot on which the single arm worked. In principle this anchor, suggesting a cross-bow in appearance, was thoroughly good, but the width of forked shank was inconvenient, necessitating a funnel-shaped hawse pipe of unusually large diameter at the lower end, up which the sea could rush with great violence. This is perhaps the reason the self-housing system was not very generally appreciated until the introduction of cast-steel anchors with light shanks which could be hove up into hawse pipes of ordinary form and diameter. Messrs. Tyzack have been kind enough to inform me that the first experiment of heaving the "Albano's" anchor up into the hawse pipe was conducted in Mr. Laing's graving-dock at Deptford, Sunderland, in February, 1884, in the presence of a large number of ship-builders, ship-owners, marine superintendents, and other interested persons. They also sent a copy of a certificate signed by the master of the "Albano," at the expiration of a voyage to Calcutta and other ports, in which he expresses entire satisfaction with the holding power and general working qualities of the anchor. The hawse-stowing system is now rapidly becoming universal,

and has been adopted not only for the largest battle-ships, but also in small sailing coasting vessels.

There is some question as to the best angle for the hawse pipes, to which Messrs. Byers, the well-known makers of the "Reliance" anchor, have drawn my attention. They are of opinion that the angle should be a certain compromise between what is good for the chain and what is most convenient for working the anchor. On thinking the matter over, I have come to the conclusion that the anchor is the chief thing to be studied, and that the practice in the Navy of making the pipe fairly steep is right. Certainly it would seem that the angle with the vertical should be always considerably less than 40° . Under ordinary circumstances the chain will hang between the pipe and the water at a much steeper angle, and even when the cable tautens out, the nip against the upper lip of the pipe will never be so serious as is the side nip when the vessel has a sheer or when she is riding ahead of her anchor.

Before leaving the hawse-stowing system, I must mention a practical difficulty of some importance which experience at the Admiralty Court has shown to exist in modern tramp steamers with stockless anchors. As a general rule such vessels are not now fitted with cranes or with any appliances for getting out or lifting in anchors over the bows. The result is that in case of breakdown or other mishap necessitating their being taken in tow, they are unable to use the hawse pipe for towing purposes unless they abandon an anchor and sometimes also a length of chain cable. Where anchor cranes are not provided, this difficulty would be best met by providing a third hawse pipe specially for towing and mooring purposes. For some years Messrs Byers have provided their anchors with one or with three heavy links between the anchor shackle and the end or bending shackle. This arrangement seems a very good one. It causes the bending shackle to enter and leave the hawse pipe on the same cant as the anchor shackle, thus avoiding the risk of the latter straining or opening out, the additional links also bringing the end shackle above and clear of the pipe, so that, if necessary, the anchor when stowed can be slipped without sacrificing chain. These anchor links have now to be proved to the breaking strain of the cable for which they are intended. Owing, presumably, to the difficulty anticipated in dealing with heavy anchors over the bows, when specially adapted gear is no longer provided, and in order to have a third anchor ready at all times, H.M.S. "Albemarle," of 15,000 tons, and other war-vessels now building, have two hawse pipes on the starboard bow and one on the port bow, for stockless anchors. Were we not assured that the matter must have been carefully considered, and that there is a good reason for it, this lop-sided arrangement would seem somewhat open to criticism, because a spare hawse pipe is at times very convenient for mooring and towing

purposes and also when clearing hawse. Sometimes when unmooring ship, both anchors come up together in a terrible jumble, and at such times the absence of the ordinary anchor davit and gear may be severely felt. The "Albemarle's" stockless anchors are of 115 cwt. each.

After all, in regard to anchors of whatever form or type, by far the most important considerations are weight and strength. We propose to deal with the latter quality first, as being the most easily dismissed.

Strength of Anchors.—A rough rule is that the safe working load of an anchor should about equal the resistance of the ship at a speed through the water of 12 knots. In order that we may put this to a practical test, H.M.S. "Greyhound," of 1,157 tons displacement, required a pull of 9 tons to tow her at the speed mentioned. The testing or proof strain is generally taken at twice the working load, and the breaking strain at about six times. The anchor of such a vessel as the "Greyhound," therefore, should be proved to about 18 tons, and should presumably withstand a strain of nearly 54 tons. According to Lloyd's Register Rules, the proof strain for the anchor of a merchant steamship of similar tonnage should be 23 tons, and the breaking strain of her chain cables about 61 tons. Since the above was written, Mr. R. Denny, of the firm of Denny Brothers, Dumbarton, has most kindly furnished me with a schedule of some 30 vessels of various types, giving the weight of best bower anchor and safe working load by Lloyd's test, also the block co-efficients of the vessels at load draught, and their calculated resistance at 12 knots. From this table it appears that the rough rule referred to is approximately correct only in the case of full-built ships whose block co-efficients are between .75 and .80. In almost every case the proof strain is in excess of the resistance at 12 knots; indeed in the case of yachts and very fine vessels the resistance at 12 knots is only about half the strain to which the anchors are proved. Most stockless anchors have an advantage in strength over anchors of ordinary form, very rarely breaking under steady strain and fair conditions.

Weight of Anchors.—In the days of wooden vessels the rough rule was 1 cwt. for every 20 tons of a merchant-ship's burthen, and in the Royal Navy 1 cwt. to every gun. Up to the beginning of the seventeenth century the largest anchors in use must have been very light, for we read in "Derrick's Memoirs of the Royal Navy" that the capstan for weighing anchors was first invented in 1610. In 1637, however, the "Sovereign of the Seas," a vessel of over 1,600 tons burthen, carried eleven anchors of about 2 tons each. From information kindly afforded by the builders, I am able to say that the "Celtic," the largest vessel now afloat, is supplied with three Hall's hawse-stowing bowers, each weighing $7\frac{3}{4}$ tons. It appears that in 1859 the "Great Eastern" was exclusively supplied with Trotman's anchors not much exceeding 5 tons in weight, exclusive of

stock. It was, of course, claimed for Trotman's anchors that a saving of weight might be effected without sacrifice of holding power; but this is scarcely consistent with modern views, weight and strength being practically synonymous. Before the advent of steam, the labour of raising and securing heavy anchors was great; lighter anchors, therefore, were used on ordinary occasions, the heavier anchors being reserved for use during bad weather and in exceptional circumstances. Anchors of varying weight and size were known as "bowers," "best bowers," and "sheet anchors"; although it seems that about the year 1800 "bower" and "sheet" anchor were interchangeable terms. Nowadays the working or bower anchors are generally the heaviest carried, yet there is reason to suppose they are in many instances too light to ensure safety at critical times. This is perhaps a natural outcome of steam propulsion, a steamship being much less dependent on her anchors for safety than a sailing vessel. For instance, in 1858 Lloyd's advised 54-cwt. anchors for 2,000-ton vessels, but in 1894 this weight sufficed for steamships of 6,000 tons under the Underwriters' Registry. In the Navy 5-ton bowers were supplied to all vessels over 3,500 tons displacement, yet to-day a merchant-vessel displacing 10,000 tons may have anchors of under 3 tons weight. It is true the largest men-of-war until quite recently carried nothing heavier than 5 tons; and the difference in the conditions affecting the two Services must be taken into consideration. While the tendency of modern practice is in the direction of lighter anchors of improved construction, with chain cables the tendency is rather the other way. Whether it be that experience has shown chain cables to be less trustworthy than they were formerly considered, or whether a heavier is required to supplement the lighter anchor, certainly the cables are heavier in proportion to size of vessel than they used to be. The "Great Eastern," for instance, with her 5-ton Trotman anchors, ex-stock, equivalent perhaps in holding power to 7-ton stockless of the present day, had only $2\frac{3}{4}$ chain; whilst under Lloyd's Register Rules the size of chain corresponding to 7-ton anchors is $3\frac{3}{4}$. The "Celtic" can certainly be no heavier on her anchors than was the "Great Eastern," yet the former vessel's cables are $3\frac{3}{4}$ inch. However desirable increase of weight may be for chain cables, it is, in the writer's opinion, still more important in the case of anchors. Under ordinary circumstances, it is true, a long length of heavy chain cable will almost hold the ship of itself, and in deep water the catenary of a heavy chain acts very beneficially in preventing jerking or irregular strains which might affect the hold of the anchor. It is, however, under extraordinary conditions that real danger of dragging the anchor arises; times during which vessels will tauten out their cables like bars, especially in shallow water. Then it is that all depends upon

the anchor; if it will not hold, of what avail the weight and strength of the cable?

Tramp Steamers in Ballast Dragging their Anchors.—I remember some few years ago, a large tramp steamer, flying light, coming into Portland, during a moderate gale from W.N.W. She let go two anchors, and paid out apparently plenty of cable, yet during the night she dragged and sheered all about the harbour, and in the morning collided with the vessel in which I was then serving. We were lying to a single anchor and 45 fathoms of cable quite comfortably. This tramp carried her hawse pipes close up to the level of the forecastle, and consequently showed a long length of taut cable above and out of the water. The impression this produced was an unfavourable one; yet it is difficult to see what bad results can be directly traceable to the hawse pipes being so far above the water—a moral, applicable to vessels in light trim, we may certainly deduce. It is, that in such cases, the old rule applicable in light weather, to pay out chain equal to at least three times the depth of water, requires modification. It should be three times the distance from hawse to bottom. Thus for a vessel, such as the one described, having her hawse 30 feet above the water, anchoring in 7 fathoms, the minimum scope of chain should be three times $7 + 5$, or 36 fathoms, rather than 21 fathoms. The ship I have referred to afterwards put into Plymouth, again taking charge of the harbour and doing further damage to other vessels. Similar instances must be familiar to many of those present, and they naturally raise a doubt whether the anchors carried by large tramp steamships are of sufficient weight to ensure safety under all the varying conditions of their employment. The weights given in Lloyd's Rules for vessels of varying size are well understood to be the minimum weights required; yet in practice, they represent the maximum it is in most cases thought necessary to provide. This is a disadvantage for which it is not easy to find a remedy; but it seems to me worthy of serious consideration by Lloyd's and kindred institutions, whether the rules governing the weights of anchors, now in force, are sufficient to meet the circumstances of modern navigation, and whether some revision should not be effected in the general interests of shipping. When the present minimum weights were decided on, it could scarcely have been anticipated that steamships would be sent on long voyages in exceedingly light trim, which has of late, become the rule rather than the exception. Another matter which seems difficult to justify from a strictly nautical point of view, is the reduction of weight permitted by the Rules in the case of spare anchors and second bowers. If the anchor, which is somewhat heavier than the required minimum, is lost or injured, it seems scarcely right to replace it with an anchor of less than the minimum weight. A vessel may, in fact, during a whole voyage have to

depend on anchors which are of less weight than the minimum applicable in her case. This arrangement is probably a relic of the practice prevailing, as already pointed out, before the days of steam windlasses. It would seem to accord better with modern ideas and seamanship, to carry bower anchors, all of the same weight and holding power.

Recent Developments of Stockless Anchors.—Quite recently a number of anchors have been patented, presenting very unusual features both in design and in construction, models of which are amongst those on the table for inspection by any who may be interested in these latest developments. In one case, the shank is connected to the head by a ball and socket arrangement, whilst the stock also is loose and free to revolve on the shank. In another instance there is a sort of parallel motion, which, however desirable, necessitates a number of weak points at the pivots. Again, we have an anchor in which the shank takes the form of a frame enclosing the one arm, which is, so to speak, all blade or fluke. In forming an opinion on the merits of anchors in general, it may be useful to remember that a pickaxe holds better than a rake and is stronger. Rodgers' anchor exemplifies the pickaxe principle, and possibly some of the modern stockless anchors verge on the rake principle. Then again an anchor is better than a mushroom. In some stockless anchors the head appears to revert in some measure to the mushroom form, the arms being comparatively short and weak.

In a stockless anchor desirable qualities seem to be strength and accessibility of the connection of shank to head, side trips or horns instead of central trips, blades and form of head to give good penetration. Correspondingly bad points, in my opinion, are: inaccessibility or concealment of shank to head connection, wide flat head reverting to mushroom type, arms curved in the plain of cross-head, central trips or canting arms.

In conclusion, I wish to acknowledge the assistance I have received in the preparation of this paper from various firms of anchor-makers, including Messrs. Charlton, Byers, Tyzack, and Wasteney-Smith, all of whom have furnished me with valuable information as to their respective anchors. To Colonel Hozier, to Mr. R. Denny, and to Mr. Goodall, of the Trinity House, my thanks are also especially due.

During the reading of the lecture the Chair was vacated by Admiral Bowden-Smith and taken by Commander Caborne, C.B.

Admiral Sir E. OMMANNEY, K.C.B., LL.D., F.R.S.:—Are stockless anchors much in use now?

Captain A. THOMSON:—Yes; they are coming into use quite universally.

Mr. TYZACK:—The paper which has been read by Commander Thomson is so exhaustive, that it does not leave much further ground for comment. There are, however, one or two small matters which may bear a little explanation. For instance, the ball-joint anchor is alluded to as something new. That is not new. There was a ball-

joint anchor in existence a good many years ago—I should say 15 or 16 years ago. I am not prepared to show the anchor, but I have the drawings of it and so forth. That is only a mere matter of detail. I am not aware as to whom the present ball-joint anchor belongs. I am not making any invidious remarks about it; but that is the case. One matter, however, has not been touched upon, namely, stockless anchors in sailing ships. For some reason or other, Lloyd's will not permit the use of stockless anchors in sailing ships, for the alleged reason that their holding power is not equal to the ordinary stocked anchors. That is a matter which requires inquiry, because if the stockless anchors are used in the Government yards, there is no reason why they should not equally be used in sailing ships. It is a much greater advantage to have an anchor which can be stowed in the hawse pipe than to have a stocked anchor, which is very difficult to get on and off the forecastle. Besides, in getting a ship under way you often want to get your anchor in very quickly, and sometimes it is not possible to do so with the ordinary anchor, which requires perhaps a matter of ten or fifteen minutes to get it on to the forecastle, whereas you can heave a stockless anchor right up into the hawse pipe.

Captain **MONRO REED**, Secretary to the Shipmasters' Society :—I should like to say that in 1862 I had a Martin's stockless anchor on board a ship. It was very much the same anchor as is in vogue now. There was a flat stock about one foot on each side. We had very little experience with them. We took them on board in London and took them out to Shanghai, where I had them down for four days.

Captain **BARRETT** (late P. & O. Company) :—One point has not been alluded to by the author in this very interesting lecture. The question of the quality of the ground that these anchors hold in best has not been mentioned at all. For instance, in good heavy clay there is no doubt the Martin's anchors and the stockless anchors are good, but for other purposes—for all kinds of ground and under all circumstances—there is nothing to be compared to the old-fashioned Rodgers' anchor. Stockless anchors are very little used for large rivers, such as the Hooghley and Yangtse. I know these stockless anchors possess an enormous advantage in that they do away with the anchor gear, the davits, the cat-heads, and the cat-falls, but when you come to an anchor which will hold a ship in heavy weather, there is no anchor to be compared to the Rodgers'. I think anyone who has been at sea will corroborate what I say.

Mr. **G. E. PUGH COOKE** :—I had a Martin's in use many years ago, and once at Shanghai when letting go the same from a Hartfield's patent windlass, the chain snapped in the hawse pipe. As the anchor was buoyed, lighters and gear were sent to pick it up, the intention being to leave the lifting gear tight at low water, and allow the rising tide to break the anchor out of the ground. The holding power of the anchor, however, was so great that the lighters had to let go or sink.

Admiral Sir **E. OMMANNEY**, K.C.B., LL.D., F.R.S. :—This is the first time I have ever heard a connected history of anchors, and I believe it is the first occasion on which we have had the subject brought before this Institution. The lecturer has rendered a most valuable service to the maritime world in general, and I am sure the paper will be read with very great interest by all naval men. As the senior member of Council present, I beg to thank him for having brought the subject before us. I am quite sure it will add much to our knowledge of the subject in general.

Captain **THOMSON**, in reply, said :—I was very interested to learn from Mr. Tyzack that there is nothing new in the principle of ball and socket connection between head

and shank. I did not know that such an arrangement had been applied to anchors before. The anchor I showed you, which has a ball and socket arrangement, is certainly a new production as far as it goes. It is called the "Britannia" anchor. I do not now remember the name of the makers. It is a good deal advertised, but I do not think it has been much used as yet. I think you will agree that it has the advantage of giving a very strong connection. Mr. Tyzack referred to the question of stockless anchors for sailing ships. I was very much interested to hear what he said, because it has entirely escaped me that the Rules of Lloyd's Register do not sanction the use of stockless anchors for sailing vessels. As a matter of fact, however, stockless anchors are used a good deal by sailing ships at present. Only the other day, at sea, I passed a coasting vessel, quite a little schooner of the modern type, with stockless anchors carried in the hawse pipes. I only mention this to show that very small sailing ships use the stockless anchor. In Messrs. Byers' advertisement there is a picture of a very large sailing ship indeed—one of 2,630 tons—also carrying hawse-stowing stockless anchors. No doubt many more instances might be mentioned, but I think these are sufficient to show that sailing ships do use stockless anchors.

Mr. TYZACK:—But not under Lloyd's regulations. I have had a lot of correspondence with them on the subject.

Captain THOMSON:—I am glad of that information, because I did not know it. Of course, the fault is not with the stockless anchors, but with Lloyd's, who, no doubt, will see the error of their ways in good time. Captain Monro Reed does not like stockless anchors. We all know that the older navigators did not like them, and they do not like them now, and they never will; but it is, I think, beyond question that stockless anchors have come to stay. It does not matter whether we like them or not, we have to use them and make the best of them, and, therefore, I thought it well in this paper to endeavour to show their good and bad points, so as to have something to base our judgment on. I have given a reason why stockless anchors do occasionally fail. There is no doubt they have failed sometimes very badly; and it may be because the anchor drags with the blades out of the ground, as may easily happen. With an accumulation of mud or of gravel in front of the trips there is always danger that the pressure against the upper trip may almost equal the resistance at the lower trip, and if that be the case the anchor will drag without biting. In stockless anchors good holding is a quality, less in evidence perhaps than convenience of stowage; but I have no doubt their holding qualities will be improved as time goes on. We may be sure that if anchor-makers find that a ship drags with a certain kind of anchor, they will improve it and make it so that the ship will not drag with it. There can be little doubt that the stockless is the form of anchor for use in future years. Captain Barrett spoke in favour of the Rodgers' anchor, the ordinary shaped anchor. I am sorry I have not a model of it here. That, as I said in the paper, is the very best anchor of ordinary form. I quite agree with him. Mr. Cooke mentioned a fact that is quite true—that stockless anchors cannot be swept. They cannot be recovered easily. At the same time, they are not likely to knock a hole in the bottom of your ship, as an ordinary anchor might. You must put the advantage against the disadvantage. I should like to tell you a little story in this connection. I can scarcely think you will believe it; but the facts are as I tell them to you. In the telegraph steamer "Silvertown" we anchored one day on the West Coast of Africa, in eight fathoms of water. This is the anchor we let go—a Wasteney-Smith—and you see it has not much to catch hold of. It has nothing except a shank shackle. When we let go, the chain broke. As it

was my favourite anchor, I did not like to lose it; so we thought we would try and recover it. We knew it was no good sweeping for it. Luckily we had an anchor-buoy—always use anchor-buoys with stockless anchors when you can. We pulled up the anchor-buoy tight. The ship was then manoeuvred over the buoy, and the ordinary cable grapnel let go. The grapnel was not down more than two minutes when we began to heave it up with a big steam engine. To my surprise and delight, the moment the drum had made one revolution the dynamo-meter went up to three tons, and I knew that we had got our anchor. When it came above the surface the grapnel was found to have hooked in the shackle. That shows, at all events, that stockless anchors may sometimes be recovered. I wish to thank Admiral Sir Erasmus Ommanney for his very kind remarks. I quite understand that people cannot be expected to take much interest in a paper like this on a very dry subject. At the same time, I think the present is an opportune moment to bring the subject forward, because we have come to a turning-point in the history of anchors. In the Navy stockless anchors are being adopted entirely. All the new battle-ships now being built are being fitted with stockless hawse-stowing anchors. Anchors will be hove right up into the hawse pipe, and there they are. It does not look nice, but it is useful. I feel certain that whenever our ships have to get under way in a hurry to chase the enemy they will find their stockless anchors very handy. I beg to thank you all for coming here this afternoon and for your kind attention to the paper.

The CHAIRMAN (Commander W. F. Caborne, C.B., R.N.R.):—The lecturer has remarked that the subject of anchors is a dry one; but I venture to think that he has put it before us in a very interesting guise this afternoon. I regret that personally I possess no more special knowledge of anchors and their development than falls to the lot of seamen generally; but as it is very certain that in the present day anchors are not of much use unless connected with efficient chain cables, I may, perhaps, be permitted to say a few words about the most recent development which has taken place in the construction of the latter. Hitherto, as we are all aware, the links have been welded, and strengthening studs have been inserted in them; but some clever men have devoted their energies to improving upon this plan, and ingenious machines have now been invented for stamping chains out of bars of iron or steel by means of an elaborate arrangement of dies. To put it tersely, a bar of iron or steel of the necessary size enters the machine from the furnace, through which it moves automatically and attains the requisite amount of heat, and leaves the former in the shape of a practically complete chain, without the employment of any welding process whatever. The enormous pressure used while transforming the bar into a chain causes considerable elongation of the metal, and the completed chain, accordingly, much exceeds in length the original bar. The ends of the links, where the principal wear usually takes place, are made of larger section, thus giving the chains a greatly prolonged existence. Up to the present time I understand that the maximum size of the chains made in this way has been 1 inch, but preparations are being carried into effect to manufacture much larger ones. There are, I believe, two firms in Great Britain engaged in introducing this new method of manufacture, and it is claimed that with mild steel chains from 50 to 100 per cent. of strength is gained over the ordinary welded iron ones. This being the case, it should be possible to use lighter cables, a matter of some importance from the point of view of the naval constructor, who is generally anxious to diminish the weights as far as possible. In conclusion, I will ask you to accord a hearty vote of thanks to Commander Thomson for his lecture, and for his able handling of an important, if at first sight unattractive, subject.

THE PRESENT AND FUTURE OF ARABIA.

By Major OTTO WACHS.

Translated by permission from the "Marine-Rundschau," January, 1902.

IT is a striking spectacle that the peninsula of Arabia, which is three times as large as Germany, although placed in the midst of the most ancient civilised peoples, has led a solitary life up to our own day; and that, even now, it embraces some of the least known regions in the world. A highly-gifted people, well-versed and eager in war, they have indeed sent out hordes lusting for plunder and yet have managed to defend themselves against conquest; even the all-conquering Romans had to be satisfied with a dubious lordship over Arabia *petræa*. States, as the term is now understood, or even in a mediæval sense, there are none, and still less is there a united State; on the other hand, the individual tribes, sprung from a common stock, have lived in a perpetual state of feud. Mahomet succeeded in uniting a large part of them in a religious and, temporarily, even in a military bond; religious zeal and aboriginal force of race carried their victorious arms in an astonishingly brief space of time into three continents and introduced an epoch in the history of the world; but Arabia itself remained in essentials what it was. The rich poetry of the Arabs, their comprehensive literature, their delicate arts blossomed freely on the soil of conquered lands; but, with the downfall of the Caliphate, Arabia again fell a prey to its old internal dissensions.

That the peninsula, so to say, fell into oblivion is, no doubt, to a great extent due to the discovery of the sea passage to the East Indies, which diverted the trade out of the East to Europe into another channel, but long before this the fact that the Osmanlis, or Turks, rose to ascendancy, as the apostles and champions of Islam, threw the peninsula back on itself; the split among the believers into the two sects of Shiites and Sunnites weakened their energy abroad, whilst the conquest of Constantinople by the Turks shifted the political centre of gravity of Islam to the Bosphorus.

Can this seclusion in which the great peninsula has been buried for centuries past any longer prevail, and will it continue? Will not the Arabs also be drawn into the intercourse with the world and world-

competition which in our days is again pressing eastwards and south-eastwards? The object of this article is to attempt an answer to these questions.

A single glance at the globe is sufficient to enable anyone to recognise the favourable position occupied by the Arabian peninsula. Geographically it not only occupies a central position between Asia, Africa, and Europe, but it is also almost equally distant from America and Australia; it cannot, therefore, but be that, to-day when the West is forcibly intruding on the East, Arabia must become an *étappe* in the movement from West to East, and that its importance grows daily.

If we extend the boundaries of the peninsula to the north-west as far as possible, then it may be considered as being washed on all sides by seas: in the west by the Mediterranean and the Red Sea, in the south and east by parts of the Indian Ocean, and in the north-east by seas without water—sandy deserts; in this connection it may be remarked that the Arabs do not regard their home as a peninsula; to them it is an island (Jezerat-el-Arab). Behind the sand-wastes the twin Mesopotamian rivers, the Euphrates and Tigris, stretch northwards as a continuation of the Persian Gulf, and it is only for a short stretch of 102 miles between the Gulf of Iskanderun and the spot where the Euphrates breaks through the rocky walls of the Taurus and reaches its extreme westerly limit that Arabia is chained fast to hither Asia. From this northern isthmus there stretches almost due south as far as the peninsula of Sinai a narrow belt of land, which forms the connection between Asia Minor and Egypt. The plastic appearance of this land—Syria—is characterised by the mountain-chain of the Lebanon, which runs from north to south parallel with the coast of the Levant; towards the east it is bounded by yellow, silent wastes, but to the west it descends steeply in a superb and almost straight façade to the Mediterranean, whose towering waves driven by the westerly wind beat wildly against it. This long stretch of coast is ill-provided with harbours; the only natural harbour being that of Alexandretta, which lies in the most northerly angle of the coast of Syria on the south-east side of the Gulf of Iskanderun. Nevertheless, there has flourished on this coast from far back in the centuries a rich sea traffic. The ancient Phœnicians defied the spite of Nature by means of artfully designed moles in their proud harbours of Tyre and Sidon; nowadays these famous sites, known as Saida and Sur, have fallen into decay, their moles are destroyed, their harbours sanded up, and their places have been taken by Beyrout and Jaffa, which have risen into flourishing shipping and commercial centres. Less important harbours on the Syrian coast are Tripoli and Acre, the last-named being able to look back upon a past rich in the history of warfare. Southwards of the Syrian coast lies the triangular mountain block known as the peninsula of Sinai, severing two oceans

and connecting two continents; on it is a desolate desert and rocky plateau, the Stony Arabia, which in the south rises to a height of some 8,500 feet; its less precipitous northern edge gives room to the old coast track between sand hills and salt seas, which from the earliest times formed the approach to the isthmus of Suez.

If a special importance attached to the isthmus from the earliest times—it has been crossed by Rameses and Cambyzes, by Alexander, Amru, Napoleon, and Mehemed-Ali—its importance has inconceivably increased since it has been cut through and since it flanks the main sea route to the Eastern World, with the Suez Canal and the Red Sea forming the connecting link between Europe, Asia, and Africa on the one hand, and the Far East on the other. This sea—the Red Sea—is known by the Turks as the Holy Sea. “Henceforth thou shalt not permit,” so runs the order given by the Sultan in 1774 to the Pasha of Egypt, “ships belonging to the Unbelievers to come to Suez. My power is great and this is my Imperial will; the Gulf of Suez is to be kept for the Pilgrims for Mecca, and the harbour of Suez belongs to the two holy cities from which streams the light of truth and the law given by the Prophet.” The shores of the Red Sea, on which the glowing rays of the sun pitilessly beat, are deficient in water and vegetation. Numerous bare islands and archipelagoes, sometimes of extinct volcanic formation and at others of coral, form a middle channel with two coast channels separated from it. These confined channels have a depth of over 1,200 fathoms, but at times, owing to unfavourable winds, can only be used by steamers.

A glance at the past history of the Red Sea is interesting. As early as 1600-1650 B.C. the great Egyptian king Thuthmosis III. maintained in it a war fleet with several naval stations; while in later times further evidence of its importance is afforded by the action of Sesostris the Great, better known as Solomon, who, in the interests of trade with the land of Ophir and India, established a fleet in the Red Sea, as did also Cyrus, Ptolemy III., Alexander, and the Roman Ælius Gallus. But even then a sensible hindrance was felt to the trade of the Sea in the circumstance that the Gulf is closed at its northern extremity, and that access is precluded to the Mediterranean; hence, even from the remotest times, attempts were made to connect the two seas, so as to divest it of its character as a blind alley. As early as 1425 B.C., Sethos I. began the construction of a canal between the Nile and the Red Sea; this work was concluded by his son, Rameses II., the Sesostris of the Greeks, being necessary to keep up his sovereignty over both seas; the fleet in the Red Sea then numbered 400 sail.

Herodotus relates how Necho II. commenced to unite the Nile with the Erythrean Sea, a work which was completed by the Persian Darius. The passage through this canal occupied four days, and its breadth was such

that two triremes could pass each other rowing. The canal was fed by the right principal branch of the Nile, starting from a little above Bubostis, and as described by Herodotus, must have more or less forestalled the course of the present sweet-water canal, during the construction of which traces of the old canal were met with. Further on the same writer continues:—"The shortest way from the Mediterranean to the Red Sea passed at a distance of 1,000 stadia from Mons Cassius, the boundary between Egypt and Syria, to the Arabian Gulf. But the canal has such numberless turns that it is a much longer way. 120,000 Egyptian workmen lost their lives in its construction."

An entirely different idea presented itself to the mind of Albuquerque. This daring Portuguese explorer planned the diversion of the Nile into the Red Sea in order to ruin Egypt and to force the Indian trade through the Persian Gulf and Mesopotamia; by the conquest of Hormuz he secured the entrance of the Persian Gulf to the Portuguese, but the days of his Indian rule were already numbered.

The desire, which dates back to very ancient times, to unite both seas by a canal has in our days, however, become a reality, thanks to the genius of Lesseps; it must not, however, be forgotten that Napoleon had already caused Lepère to survey the isthmus with a view to constructing a canal, and that between 1820 and 1840 the Austrian Negrelli, in particular, in whose footsteps Lesseps followed, was busy in this direction.

To describe the canal further would exceed the limits of our task; moreover, the importance of this most valuable sea route is known to everyone; in peace it serves as the highway for the traffic and culture of the world, whilst in the event of war it is destined to play a leading rôle. It is necessary, however, that we should give a brief description of the Arabian side of the Red Sea, which it has practically made accessible. The eastern shore of the Red Sea really possesses but few harbours to claim attention. The first to claim importance is Jidda, lying on a low, sandy plain in the province of Hedjaz. The harbour is protected in a singularly wondrous fashion by three continuous parallel lines of coral reefs, within which ships anchoring lie well protected from every direction of wind. The town, next to Mocha, is one of the chief centres for European trade; it possesses a dock and is a Turkish naval station. A citadel has lately been built for its protection to the south of the town walls, which are flanked by towers. The main thing, however, which gives Jidda its importance is that it forms the entrance port to the metropolis of Islam, where hundreds of thousands of believers land yearly on their way to perform their religious rites at Mecca. Tradition has it that Eve, the mother of man, died at Jidda, and that she rests in a tumulus named Ununima, rising to the north of the town; if so, she must have been tolerably tall and slim, for the mound is less than 2 yards wide and

over 100 yards long. Jidda means "City of the Grandmother." The climate is appropriately described in the popular saying: "Pondicherry is a hot bath, and Aden a smelting oven, but Jidda is hell."

On the coast of Yemen is Hodeida, the western entry port of the province, which is one of the most fruitful parts of the peninsula, and since ancient times has been named "Arabia Felix"; as there is no harbour, vessels have to anchor in the roadstead some two miles from the shore, where there is a depth of about $4\frac{1}{2}$ fathoms.

Mocha, which is favourably situated, and which was at one time the first trading centre of Arabia, has lost much of its importance since traffic has gone through the Suez Canal.

The Straits of Bab-el-Mandeb, in 13° N. latitude, connect the Red Sea with the Gulf of Aden, which washes the south-east coast. The Gulf of Aden derives its name from a coast town lying on the 45° longitude east of Greenwich, and situated in the S.W. of Arabia; it forms, after Suez, the next important port of call. The strategical importance of Aden was early recognised by the Romans, who, not satisfied with merely garrisoning it 24 B.C., also fortified it, as may be seen by the remains of a wall hewn out of the rock on the north of the peninsula, and by the broad and deep ditches still traceable. When in A.D. 950 the Mahometans overran so large a portion of the known world, Aden was the most renowned harbour town in Yemen, and in 1276, according to Marco Polo, there flourished here a rich commercial town with 80,000 inhabitants and 360 mosques. In the 16th century the town fell to the Portuguese by Papal award, but as early as 1538 they were forced to hand it over to the Osmanlis. In 1730 Aden came into the possession of Scheik Lahadj, and remained in the hands of his descendants until 16th January, 1839, when the British, who had for some time recognised the advantages of its position, as from there the southern outlet of the Red Sea could be best dominated, took possession of it. Singularly enough, the Dutch set little value on Aden, although Linschoten and the Portuguese Albuquerque, had drawn attention to its excellent position. Aden has been turned into an impregnable sea-fortress by the English; it is held by a large garrison, and is the most important *étappe* on the Asiatic sea route. The long sea shore stretching eastward from Aden as far as Ras-el-Hadd, is harbourless and of no importance. In striking contrast to this, however, are the two sea-basins, which from the Arabian sea run north up to the same latitude as the town of Suez, the Gulf of Oman, and the Persian Gulf. The first-named, which has a width at its southern end of some 120 miles, narrowing gradually to 29 miles at its north-west extremity, is deep and free from dangers. On its Arabian shores there are but few places to demand our attention, but these are of great importance. The first

of these is Muscat, the capital of Oman, and the residence of the Sultan. It stands in a plain which is surrounded by granite hills some 400 feet in height, and on its north side it lies close to the harbour, which is shut in towards the east by Muscat Island, a steep, rocky islet some 1,520 yards long by 500 yards broad, and on its south and west side affords a safe anchorage against all but northerly winds. The town, an old stony nest with wild surroundings, possesses, besides other fortifications built by the Portuguese, the out-of-date fort of Jalali in the north-east and Merâni in the west. A castle on the island, similar to the fort standing on a spit of land some 600 yards north of the town, affords protection to the harbour. Muscat has a dockyard and an English coal depôt, before which a British gun-boat is anchored. The town forms the sea-gate to the Sultanate lying behind, which is separated towards the west by a desert from the rest of Arabia not only geographically, but also historically and politically. The heat of Muscat is often almost insupportable.

About two miles west of the town is Matra, the commercial centre of the Sultanate, with a good harbour, which is used by shipping, and to which caravans from the interior come. About six miles south-east of Muscat is Bandar Jissa, a small anchorage, easily taken up, and affording good shelter. An island, some 600 yards long by about 150 feet in height, protects the entrance to a much-indented bay some 1,500 yards long and broad; and while the eastern entrance to this has a breadth of about 300 yards, with a depth of $4\frac{1}{2}$ to 8 fathoms, its western end is almost completely blocked by a rock which barely shows over the surface of the water.

A conically projecting promontory extending from the south-east Arabian coast as far north as 26° N. lat. forms the northern portion of the Sultanate of Oman between the two gulfs; its northern extremity, known as the Ras-el-Jebel, *i.e.*, the Cape of Mountains, is covered with mountainous chains and high peaks, and in the north is greatly indented by deep sea inlets. Off its northern extremity, and only separated from it by a narrow channel, 26 fathoms in depth, there lies the stormbeaten Island of Musandam, which rises steeply to a height of some 920 feet, and is accessible only by three small coves, the northern extremity of which is known as Cape Musandam. This much-scored portion of the Sultanate, with the Islands of Kishin, Larak, and Hormuz, lying in crescent formation to the north and surrounded by the Central Asiatic shore, forms the Straits of Hormuz in which the waters of the Gulf of Oman mingle with those of the Persian Gulf.

North-east of Ras-el-Jebel there opens out the excellently proportioned Bay of Kubbât Ghazir, which the English call Malcolm's Bay. A still better anchorage, however, is afforded by Elphinstone Bay,

which is separated from the former by an isthmus some 1,000 yards in breadth, where the largest armoured ships can anchor, and the whole British fleet could find room. Lord Curzon, in his "Persia," Vol. II., p. 448, especially recommends this anchorage as a base for an English squadron.

This last bay really belongs to the Persian Gulf—to the "Sinus Persicus" of the ancients, the Bahr Fâris of the Arabs. This basin bears a considerable resemblance to the Red Sea, *e.g.*, in its characteristics of running northwards, in its connection with the ocean by a narrow sea channel, and in the somewhat similar gulfs leading into it. The Arabian shore for the most part is low-lying and sandy, fringed with reefs and shoals; while the heat in the Gulf is almost more oppressive than in the Red Sea. On the Arabian coast only two estuaries need be mentioned. The first is the deep bay formed by the peninsula of Katar, with the island of Bahrein in its middle; and the second is where, in 29° N. lat., the sea a second time, although not deeply, cuts into the mainland in the Province of El-Hasa—this bay is called after the adjacent town of Koweit (20,000 inhabitants). The last north-eastern boundary of Arabia is formed by the twin rivers Euphrates and Tigris, which flow down from the north in almost an axial line with the Persian Gulf.

* * * * *

After thus briefly sketching the surroundings of Arabia, of which only a comparatively small portion belongs to Turkey, whilst the remainder is either independent or nominally under the protection of independent sultans and sheiks, we will now approach the question as to what this land conceals within.

In the first place, the religious movement is the elementary force which here more than elsewhere makes itself felt; after this the political, commercial, and strategical factors are those which demand attention.

Three great religions, Judaism, Christianity, and Islamism, have their cradle in Arabia—Sinai, Palestine, and Mecca, being their birthplaces respectively. Sinai lies geographically in the centre. What a mighty contrast there is between the physical features of the peninsula of Sinai and the great historical events to which it has given rise! In the midst of a silent, death-like, stony waste, Gebel Musa, the High Altar of the Jewish-Semitic world, lifts its head, its silhouette dominating the surrounding country, and here it was, according to tradition, that the chosen race received the stone tables of the law. To the Christian, Palestine is holy ground. Here, in Nazareth, the star arose that kindled the movement which was fraught with such portentous consequences to the world. Christianity binds the West to the East, leads all thoughts to the place of its origin and

enables us to understand the eagerness of the impulse eastwards which gave birth to the Crusades. Since the days of Saint Louis, France has looked upon herself as the champion of Catholic thought and Catholic interests in the Levant; and if the title of Franks even to this day stands in Syria as the generic name for all Christians, its use is but a recognition of the duties performed in earlier times by France. Now, however, it is different, for whatever may have been the case before, the visit of their Imperial German Majesties to Palestine in 1898 brought about a change, and German Christians now stand under German protection. If formerly France held it as a point of honour to guard the rights of all Christians in the Levant, Germany to-day considers it her special duty to afford countenance and protection to her Christian subjects.

Six hundred and seventy-three years ago Friedrich II., one of the greatest of the German Emperors who ruled over the Roman Empire, undertook an expedition to Jerusalem, where he put the crown of this Kingdom upon his own head. Still more important, however, than this fleeting tie is the connection which exists between Jerusalem and Germany through the Order of the Teutonic Knights. Founded on the soil of the Holy Land, this Order transferred its weight and authority to the Balte, where it laid the foundation of that military and state organisation which became later on one of the firmest supports of Prussia. It was also in accordance with the Hohenzollern tradition that the Crown Prince Frederick William visited Jerusalem after the opening of the Suez Canal, where the Sultan Abdul Aziz presented him with the Johanniter Haus. The Crown Prince of Prussia did not hesitate, but in presence of the high dignitaries of Jerusalem took joyful possession of the undoubtedly old, but to him priceless, ruin. For the rest, Jerusalem is not only a holy city to Jews and Christians, but to the followers of Islam also, for to this day they call it "Elkodsch"—"the holy."

This brings us to the third great religion, Mahometanism, the cradle of which belief and the power it created stand in the ancestral home of the Arabs, the rocky, burning Hedjaz: "Arabia only can give us a religion," exclaimed the great Prophet on his death-bed. Islamism is the religion which more than any other has restricted independent thought, and which has caused more blood to flow than any other form of faith. For Islamism is not only a religious belief, but, in a higher sense than the two others, it is a political and military religion. To convert all men was the Prophet's command, but not by teaching and conviction have converts been brought to accept it, but by the sword, and, if they resisted, by annihilation. It was the Koran which gave the Arabs irresistible force and fanatical zeal, and which strengthened the mailed hand thrust out from the desert to subjugate half the world. The military centre was in the first instance at Medina, and the first Arab leaders could with

much more reason boast that their victories were won in the religious schools of that town, than the Duke of Wellington could claim that Waterloo was won in the playing fields of Eton, for in the latter case the Prussians had to come up before the day was decided. Had the Arabic tide not been stemmed both at Tours by Charles Martel, and almost at the same time before the walls of Constantinople, then the ring round the Mediterranean would have been closed in the North, and Europe would have lain fettered in slavery by Islam. Then Crusades threw Islam on the defensive; and although a new leader arose among the Ottoman Turks who renewed the onslaught, yet his efforts were frustrated by the forces of Germany, Poland, and Venice. Step by step Islam has had to give way since; but anyone who from this would draw the inference that it has lost its aggressive tendency and that it no longer portends a danger to Christendom and Christianity would draw a wrong conclusion. Sufficient warning of this has been afforded by certain recent local signs; experience, moreover, teaches us that fanaticism never dies: it continues to smoulder under the ashes and a spark may rekindle it.

Since Mecca is the pivot of Islamism, and also at the same time the headquarters of Mahometan secret societies and conspiracies, whose threads spread out over all lands in which the believers are to be found, the efforts of England to get possession of Mecca, and to have the Union Jack flying over Jidda, can easily be understood.

In recent years there have appeared in the English papers articles which have been emphasising the necessity for placing Arabia, which is much richer and more cultivated than is generally believed, under British protection. A protectorate over the holy city of Mecca, which, according to Mahometan tradition, stands on the spot of ground immediately over which God's throne is placed in Heaven, and over Medina, would signify a power over the world of Islam not easily to be estimated, and England, with her 56,000,000 Mahometan subjects, would have a very lively and special interest for placing her foot there. If the Sultan has been the Head of all Believers since 1517, he has occupied this influential position solely by his overlordship of the Arabian holy relics, and by the renunciation of the Scherif of Mecca. Such efforts aim at altering Arabia from a sphere of English interests into the sphere of English power.

This brings us to the field of political domain, and the more the merely geographical picture of Arabia pales in order to admit of the historical side standing out in relief, the more the old and for so long a time unprogressive past changes itself into the rich, multiform, and glowing present, so much the more full of significance appears to be the great Arabian arena, in which the struggle for the great prize will be shortly entered upon: for the position of the peninsula in respect to the

three old continents is of such a kind that the life interests of the ruling nations come into violent opposition. Whether Arabia, with Egypt, will be merely the anvil in the coming contest, or whether the old popular strength and religious zeal will wake up to itself strike a blow, nobody can predict. Up to now, English influence is predominant in Arabia, for Albion holds the protectorate over the Sultanate of Oman, and exercises an influence over the tribes in the vicinity of Aden. To extend this influence, or even to transform it, should not be difficult to the English, in view of the perpetual feuds among the warlike tribes.

In Arabia, if appearances are not deceptive, the political will out-rival the economical gain or development. But that the peninsula by no means only encloses unfruitful lands we know already from the old reports on the wealth of the Queen of Sheba, and as is shown by the Sultanate of Oman being known as Arabia Felix, the wooded, mountainous districts, and also by the coffee culture, while for centuries it was the only land from which the more costly spices came. The economical development requires, however, more time than the hurrying policy and rivalries of our days can spare. If, however, the wisdom of diplomacy fails in politics, then the military forces will come into play. To these we have, therefore, now to direct attention and to consider the strategical movement. Before all, Syria occupies the foreground, not merely because it is a land to be passed through, but also because it presents many fronts, seawards and landwards. It was not, therefore, by mere chance that this land, lying between the blue Levant on the one side and the hot plains of the desert on the other, that this isthmus from time immemorial saw the roads leading through it ravaged by the passage of conquering Asiatic and African armies. Phœnicians, Jews, Assyrians, Persians, Greeks, Romans, Turks, etc., all have left traces of their blood, of their character, and of their language.

Behind the straight stretching façade of the Mediterranean, Syria's mountain watch-towers rise grim and massive. We stand on the threshold of Asia, and, next to Egypt, Syria is the real dominant land in the eastern Mediterranean. Waste deserts cover the land in the east and south; on the west the shore is washed by the tepid waters of the Mediterranean; on the north, however, chains of mountains stretch like a protecting wall from the Mediterranean to the Euphrates.

Whoever rules over Antioch and Aleppo is ruler over Syria, because from these places all roads are open to him, whilst he is also in a position to deal with anyone trying to displace him. From the land side an advance is only practicable from the north, from Anatolia, after the mountain defiles have been secured, whilst on the south, from Egypt, advance is only possible along the famous coast road over Ghazze and Akka. The possession of this coast road has invariably been proved to

be decisive in struggles between Asia and Egypt from whichever direction made. It is sufficient to name Cambyses, Darius, and Alexander on one side, and Sesostris, Saladin, and Napoleon on the other. From the sea it is true this highway is easily obstructed. What Ghazze and Akka do for Syria in the south, is done by Aintab and Beylan in the north.

Syria is least protected from the direction of the Mediterranean, and therefore from there the naval strategical base for the whole of north-western Asia the country is easiest entered. An attack from the sea can, of course, only promise lasting success to a Power having command of the sea, and who at the same time is supported by the advanced position of Cyprus or by the possession of the harbour of Alexandria, because the Syrian ports, as we have seen, are too small and lie too much exposed. Up to the present Albion has delayed in making use of her favourable position in Cyprus, an island which was once taken in fief by the German Emperor Friedrich II., in order that it might serve as a base for his plans against the East, who thus showed a keen perception of the exceptionally favourable position of the island, the influence of which upon the coasts of the mainland opposite to it cannot permanently be affected.

The only Syrian anchorage where an expeditionary corps could find shelter against the force of the elements is at Alexandretta. The operations from here towards the south would necessitate the forcing of difficult mountain passes—the Syrian doors of the ancients. If the weather is favourable, it must be understood, troops could be landed at other places on the coast, but this would not be of much use, because of the difficult nature of the country, for after one position is taken another equally strong one is met with, which would in turn have to be forced. Just as the conquest of the land is difficult, even so does its defence appear to be easy; and so also with the middle of Syria as a base an offensive movement against the Euphrates Valley, the Persian Gulf, the Suez Canal, or the Red Sea. "Is it a matter of indifference," asks Gabriel Charmes, in his "*Politique extérieure et coloniale*," "to leave a large Catholic *clientèle* in the lurch in a country possessed of such advantages?"

Syria and Egypt were the focal spots of the old world, for here began human history before turning westwards, and in spite of intervening deserts, the set of one land is towards the other; so that in reality the epochs of separation between the two are shorter than those of their union. As soon as a strong ruler arose in Egypt he at once stretched an arm after Syria. The peninsula of Sinai rises as the natural corner bastion of the Syrian coast; it is also at the same time the east flanking bastion of the Suez Canal, which we shall now examine more closely.

Although the successful construction of this waterway between two oceans stands as a brilliant sign of scientific progress, it is yet at the same time surrounded by the spirit of discord. The Canal, a connecting link

between the Mediterranean and the Red Sea, it is true, opened for Britain a door to world territories in which she ruled in almost solitary grandeur and in undisputed power; but it at the same time also opened the way to other Powers, who had never previously felt the impulse, to found colonies and drew the Northern Powers with irresistible force into its vortex. As a consequence there arose not only rivals in trade and policy to England, but the keels of foreign ironclads also ploughed their way to Eastern waters; so that the moral and naval strategical change brought about by the union of Levantine waters and the Red Sea consists not so much in the fact that Albion has lost nothing, as that other Powers have won much. England must defend the life artery of the Suez Canal; such a task is difficult and can—we only lay stress on one point of moment—only be effectively done if she can bar the mouth of the Dardanelles. Besides, Lesseps' Canal offers but very small possibilities of defence. As a relentless geographical fact this weakness is well known in England, as is shown from the utterances of British authorities. The question is whether the safety of the Suez Canal is equal to its worth for England, *i.e.*, whether safety for the future, which England cannot do without, is to be obtained. The Canal, if not legally, yet in reality, in England's hands, represents for the mistress of the seas, so long as she is in a position to guarantee its navigation by her fleet, an *instrument of power*, but, if otherwise, a danger. The guarantee for its safety depends upon whether England's position in the Mediterranean and in the seas lying to the south of the Canal is unshakable.

Now to come to the Red Sea, which Lord Salisbury once described as a *corde sensible*. From this basin, erstwhile shut in on the north, sprang the first sea and trade routes of the world, which in these latter days stand in the forefront, from the world's interest in the Far East. Even if the Arabian shores of this sea at present bear an inoffensive character and its harbours lie desolate, yet these in the hands of a maritime Power may yet attain importance: an importance likely to be all the greater because from them it may be possible to exert an influence on the not far-distant African shores, where already the colours of England, France, and Italy are to be seen.

With a wise prevision of coming events, England took possession of Kamaran Island. Other seafaring nations who have maritime and colonial interests to look after in the Indian and China seas, already possess, or are endeavouring to obtain, harbours of shelter and coaling stations. Even Germany is on the point of securing a naval base in the Red Sea, and has leased the Island of Koumh from the Porte in the Farsan Archipelago. In consequence of this action on the part of Germany, the French are beginning to revive their claims upon Sheikh Said, the little port on the Asian side of the Strait of Bab-el-Mandeb.

As far as Sheik Said is concerned, we will content ourselves by saying that the Strait of Bab-el-Mandeb, or "Gate of Tears," which has long been a door of good luck to England, might easily revert to its old appellation.

Limited space precludes our dealing just now with the strategical conditions in the Gulf of Aden. We have already alluded to the stronghold, after which the bay is named; it is the iron key and trading centre to Yemen and South-west Arabia, and its influence extends over a large portion of the Indian Ocean.

The Sultanate of Oman, which was for centuries an independent State, and which once disputed the supremacy of the Portuguese in the Indian Ocean, must to-day, following the dictum of Lord Curzon in his "Persia," Vol. II., p. 443, be considered as a dependency of England. "We allow the Sultan a subsidy, we determine his policy and we shall allow no foreign intervention here," writes Lord Curzon. Further on he says:—"The Union Jack will float over the battlements of Muscat." The independence of the State in question and its naval power were buried as long ago as 1862, when, in the conflict between the Sultan and his younger brother, who had illegally seized the sovereignty over the distant but important possession of Zanzibar, England, as arbitrator, decided that Zanzibar should remain liable to tribute, but otherwise be independent. The Island of Zanzibar, which is not only of importance on its own account, but also through its connection with the central East African coast, is to-day in English hands. As regards Muscat, Sir Richard Temple, in a lecture at the United Service Institution on 3rd May, 1899, asserted:—"Muscat belongs to us, and we must uphold our right to it, if necessary, by force of arms." A tangible instance of how earnestly Britain is prepared to follow this advice was afforded a short time ago in the attempt made to establish a French coaling station at Bandar Jissa, which failed owing to British intervention.

When steering from the south one has passed the Strait of Hormuz, the ship enters the waters of the Persian Gulf, which from the very earliest times has played a striking part in history. It is known that the Gulf was thoroughly surveyed and minute sailing directions were prepared by Nearchus, Alexander's admiral. Later on the Gulf was the scene upon which first Portugal, then Holland, and lastly England, fought for ocean supremacy, just as to-day it is the theatre of hard conflicting aspirations. In Peter the Great's apocryphal will he is made to say:—"Hasten the fall of Persia, make for the Persian Gulf, quicken from there the old trade to the Levant, so as to be able to march on India, the treasure-house of the world." This old solution has never been forgotten in the empire of the Tsar, and is kept alive by the ever-louder reverberating cry: "Forward, to the Persian Gulf." This sea

basin represents for Russia the main gate to the ocean, and geography—who can deny it?—says Yes. On the other hand, this basin, brought nearer to Europe by the Suez Canal, is one of the most vulnerable positions for English world dominion, and for the sake of India England must take it into her strategic calculations. According to the *Levant Herald*, the Gulf is now even a more important portal to India than the Red Sea itself. In May, 1899, the *Globe* said that at any cost Russia must be prevented from nestling down on the Persian littoral, whence she would be able to flank India by land as well as by sea.

What this signifies to England may be gathered from what Lord Curzon, now Viceroy of India, says in Vol. II., p. 465, of his "Persia":—"A Russian port in the Persian Gulf would be a provocation to war. The British Minister who was guilty of acquiescing in such a surrender would be a traitor to his country." Further on, at page 603, he says:—"Russian influence in Southern Persia and the Persian Gulf must be combated, not only in the interests of Persia, but in the interests of Great Britain. The safety of India, which is the first duty of England, and the *pax Britannica* that now reigns in the Southern Seas, are incontrovertible arguments against any such aggression." Similar views were expressed at a meeting in the United Service Institution on 3rd May, 1899, by Sir Richard Temple, who stated that:—"As the great British ocean routes would be threatened by an enemy from the Persian Gulf, England must never allow one to get a footing there; the Gulf is a British sea and must always remain so." It is thus made clear why England keeps such a sharp eye on the Gulf and sends into it such an array of consuls, garrison guards, and war-ships. For the same reason in 1890 she took possession of Bahrein Island, which lies at the head of the roads leading from the East to Mecca, whence the ancient Phœnicians emigrated to Syria. These roads lead from the Gulf to the Holy City through a broad depression of country well studded with oases. It is much travelled by Mahometan pilgrims, besides having commercial and strategical importance. It was for this reason that England established a coal depôt on the Island of Kischm, and is endeavouring to establish a protectorate over Koweit, with its valuable trading centre and excellent harbour. The fact that this place is the terminus of the projected Bagdad railway makes Great Britain feel nervous.

How great an importance, however, may the Persian Gulf not attain when at its present stagnant northern extremity, for which Alexander dreamt a great future, new life springs forth, and when the two Mesopotamian twin-rivers, which take their rise in the heart of West Asia, again begin to exert an influence upon history. As soon as they again throw their military value into the scale the old saying,

"Whoever possesses the Euphrates and Tigris rules over hither Asia," will again be true. The railway between Anatolia and the Gulf, an arterial passage between Europe and the East, must necessarily prove a factor of incalculable value in the solution of the Central Asia question.

The value of Arabia is not to be measured by its size, since its position in regard to sea dominion, to neighbouring lands, and to adjacent coasts is more important than its territorial extent; in a word, its position is typical.

The political and strategical value of the sea depends upon its importance as the basis of the main highways. As, now, the Suez Canal is a world route of the first rank, which has taken the place of other routes to India, it is predestined as the great watchword of the future. To recognise this highly important fact lies in the interest of all nations and States who are concerned in keeping up connection with the Far East, and who, now that morality is not the order of the day, do not desire to allow themselves to be trodden down in the pitiless struggle for existence. Hence the centre of gravity of colonial rivalries lies in the mighty defile of the Suez Canal and of the Red Sea, and the right of passage bears here an European, if not a world character. The Suez Canal, so long as England commands the Suez route, is her most profitable possession; but if endangered, then it will become an Achilles' heel; for this reason, therefore, England's Suez policy is not a policy of inclination, or even of conviction, but rather a policy of *necessity*. As far back as May, 1877, Lord Derby wrote to Shuvaloff:—"Any interference with the police of the Canal, or the garrisoning of its banks, would be regarded as a threat to India and as a serious attack on English trade." Whether Great Britain's forces are sufficient to keep open the road from home waters through the Mediterranean, etc., to Bombay is the great question.

On two occasions we have dealt with the Suez route in the Mediterranean,¹ and we shall, therefore, here only briefly allude to that portion of the route which extends from Port Said to Muscat, where Arabia comes into play as a factor. England stands in Egypt on the western side of the Suez Canal; on the other side, however, as already stated, the Eastern main roads debouch not far from Pelusium, where so many important events have taken place. If the upper trap-door of the Red Sea—the Suez Canal—appears to be threatened on the land side by the Arabs, the lower outlet, where Sheikh Said lies in the Strait of Bab-el-Mandeb, and where the spheres and interests of three Powers clash, may one day unexpectedly be the scene of disagreeable strife. The safest refuge where stormy times may be tided over and whence

¹ See "Schlaglichter auf das Mittelmeer"; and "Malta, seine kriegshistorische Vergangenheit und seine heutige strategische Bedeutung."

offensive attacks may be made is at formidable Aden, whilst further on the left flank of the route is safe-guarded by Muscat.

As the south-west extremity of Arabia is probably destined to play an important rôle in the future, so also may, possibly, the Strait of Hormuz. The most important points at this focus, where two seas meet, are, in addition to the floating war material, the northernmost part of Roos-el-Jebel, with the islands of Kischm and Hormuz; on the latter there once flourished the trading town of the same name, where Albuquerque had his headquarters. The much-talked-of Bandar Abbas lies in a favourable position on Asiatic ground. Although England is in possession of some islands in the seas surrounding Arabia, and either possesses or influences important places on the coast, which are well adapted for *points d'appui*; and although she at present disposes of a mighty fleet, yet all these advantages are insufficient to guarantee—and this is the point of our approaches—Great Britain's position as a world Power in Asia. In "Forty-one Years in India" Lord Roberts remarks: "In Asia Great Britain is a Continental Power, and consequently her interests must be protected by Continental means." The subsidising, however, of Asiatic tyrants cannot be considered as reliable means; one must be supported by disciplined European Armies; that England disposes of such means to a limited extent only is well known.

The most pleasant of statesmen and soldiers cannot get over hard geographical facts in peace-time, and still less so in war-time. Over the chessboard, which we have been contemplating, railways passing over it, or leading to it, are elements of considerable importance. The English project of a railway, Port Said-Bassa-Karachi, which is to ensure English dominion in the Red Sea and in India through possession of the Persian Gulf, will certainly remain nothing more than a project just like the British Euphrates railway, for which Cyprus was to have served as a bridge-head.

From all that we have here said, it results that a great and stirring future awaits Arabia, and that probably ere long; the question, however, is to which Powers Providence will entrust the peninsula—this storehouse of the richest political and military value—in whole or in part.

As far as Germany is concerned, it is hardly necessary in this place to recall the fact that the route to the largest and most important of our foreign possessions passes through the Suez Canal; that our mercantile fleet using the Canal occupies the second place in the numbers and size of the ships; and that to characterise our interests in the Persian Gulf one word only is required: the Bagdad railway.

The German Empire in its development has been constrained to send its surplus population into the outer world, consequently it must either be a world Power or nothing. It must, unmoved by the warning voices of

the Hanseatic league, bear in mind that there is no going back, and that only by going forward can all be won; it must not in the face of the most militant politics allow itself to be defrauded of its rights. Without sea power, however, there is no world power; just as, in the same way, no world power can rely solely on sea power—it must at the same time have land power.

If the Fatherland is not to renounce its claims and hopes for the future, if it is not to let the seas be barred against it and to lose its sea-borne trade, then it must utterly repudiate such untruthful statements as "Germany needs no fleet"; "Germany has no interests in the East," etc.; the knowledge of the great fact, that maritime trade can only thrive if the broadest view of all it entails is fully accepted, must also be impressed upon the nation, which must rather put its confidence in men capable of carrying out great undertakings than in feeble cavillers.

For is not this Wisdom's last word?—"He only deserves freedom and life who daily struggles for them."

THE FRENCH NAVAL MANŒUVRES OF 1902.

The following Résumé of the French Manœuvres has been compiled from the rather meagre and somewhat conflicting accounts which have appeared in the French papers. The Editor cannot vouch for its complete accuracy, but he believes that in the main it will be found fairly correct.

THE French Naval Manœuvres were this year, for the second time running, held in the western basin of the Mediterranean, the fleet taking part in the operations being composed of the combined Mediterranean and Northern Squadrons. The supreme command was again vested in Vice-Admiral Gervais, who flew his flag on board the first-class battle-ship "Bouvet," this being the third year in which he has held the appointment, and he had as his Chief of the Staff the late Rear-Admiral Merleaux-Ponty, whose sudden death in Paris a few days after the return of the fleet to Toulon, while engaged in drawing up the official report of the manœuvres for the Minister of Marine, caused general regret through the Navy, as not only was he extremely popular, but he was the youngest and one of the most promising of the flag officers on the active list, being only fifty-two at the time of his death.

THE COMPOSITION OF THE FLEET.

First-class battle-ship—"Bouvet" (flag-ship of Commander-in-Chief).

Torpedo-boat destroyer—"Hallebarde," as tender to "Bouvet."

Mediterranean Active Squadron.

First-class battle-ships—"St. Louis" (flag-ship of Admiral de Maigret, Commanding Squadron), "Charlemagne," "Gaulois," "Iéna" (flag-ship of Rear-Admiral Marquis), "Jauréguiberry."

Reserve Division.

First-class battle-ships — “Brennus” (flag-ship of Rear-Admiral Besson), “Hoche,” “Masséna,” “Carnot.”

Cruiser Division.

First-class armoured cruisers — “Pothuau” (flag-ship of Rear-Admiral Boutet), “Chanzy,” “Latouche-Tréville,” “Amiral Charner.”

Second-class cruisers — “Cassard,” “Du Chayla.”

Third-class cruisers — “Galilée,” “Linois.”

Torpedo-avisos — “Dunois,” “La Hire.”

Torpedo-boat destroyers — “Pique,” “Condor,” “Épée,” “Espin-gole,” “Flibustier.”

Squadron of the North.

First-class battle-ship — “Formidable” (flag-ship of Vice-Admiral de Courthille, Commanding the Squadron).

Second-class battle-ship — “Courbet.”

Coast-defence battle-ships — “Bouvines” (flag-ship of Rear-Admiral Péphau), “Amiral Tréhouart,” “Jemmapes,” “Valmy.”

First-class armoured cruisers — “Dupuy de Lôme,” “Montcalm.”

Torpedo-boat destroyers — “Cassini,” “Durandal,” “Fauconneau,” “Yatagan.”

Making a total of sixteen battle- and coast-defence ships, six armoured cruisers, four protected cruisers, twelve destroyers; in all, thirty-eight ships and vessels.

The défenses mobiles of Toulon, Oran, Bizerta, Tunis, and Corsica were also detailed to take part in the operations. No ships were specially commissioned for the manœuvres, but the ships of the Reserve Division of the Mediterranean Fleet, which took no part in the first phase of the operations, had their crews completed to full sea-going strength by Reservists drawn from the five principal sea-ports, and by the officers who had just completed their gunnery course, as well as by some of the students from the Naval Academy, the remainder of whom were distributed among the other ships of the fleet. Captain Desbrière, an officer of the Military General Staff, well known as the historian of “Projets et Tentatives de Débarquement en Angleterre,” was embarked on board the “Montcalm.”

The coast-defences and garrisons of Bizerta, Algiers, Ajaccio, and the Hyères Islands also took part; only one submarine, the “Gustave Zédé,” seems to have been employed, while two colliers were chartered to accompany the fleet. Three cruisers of the Northern Squadron, the armoured cruiser “Bruix,” the second-class cruiser “D’Assas,” and the third-class cruiser “Surcouf,” were absent in the West Indies.

The Umpire-in-Chief and the Manœuvre Regulations.—Vice-Admiral Gervais, as last year, combined the duties of Commander-in-Chief of the Fleet with those of Chief Umpire; his flag-ship and her tender were neutral in principle, but the admiral had the right of taking part on one side or the other, so as to establish equilibrium, if he considered it advisable for any reason to do so. Presumably, assistant-umpires were attached to each division, as on previous occasions, although the fact is not stated; the manœuvre regulations which were in force last year were ordered to hold good this, but apparently they were considerably modified, as instead of numerical fighting values being attached to every individual ship, the battle-ships composing each squadron respectively, were all counted of equal value; but as will be seen, the fighting value of the different squadrons seems to have been fixed by the Commander-in-Chief to meet the necessities of the different operations, as they were carried out. The regulations for placing ships out of action, as laid down last year, were as follows:—

On the hostile forces meeting, fire was to be opened when within 5,000 yards by the discharge of a single gun.

With regard to the result of an engagement, the stronger ship to keep the weaker under fire for twenty minutes at a less distance than 5,000 yards, or for ten minutes if under 3,000 yards distance, or if she crossed at under 1,500 yards. At night these distances were reduced by half.

For a ship to be considered torpedoed, it was necessary that the torpedo-boat should discharge her torpedo at a distance of not more than 400 yards and outside an angle of 30° from the line of keel of the ship attacked. If before discharging her torpedo, the torpedo-boat was under the ship's search-light for two minutes, she was considered to be destroyed.

Every ship considered torpedoed lost: a battle-ship, a quarter of her value; a first or second-class cruiser, a third; a third-class cruiser, half.

During engagements ships had to keep a strict account of all the munitions that would have been used, and if a ship ran out she lost all fighting value for 24 hours, which was the time considered necessary for her to replenish. The same rule applied to torpedo-boats, which had expended all their torpedoes.

The manœuvre field extended from the Atlantic east to Bizerta, and from there to Corsica and the French coast; neutral harbours and waters could not be used, while in the different phases of the manœuvres the field of operations was restricted and defined in the orders.

The Concentration of the Fleets.—The Squadron of the North left Brest on the 30th June, proceeding to Lisbon, where it coaled and waited further orders. The Mediterranean Squadron left Toulon on 5th July, and when off the Balearic Islands detached the cruisers to Oran to complete with coal, while the battle-ships made an attack upon the fortifications of Algiers, with a view of solving certain points connected with the fortifications, as also to give the garrison an opportunity to practise the training of their guns against an attacking squadron under way. At the conclusion of the exercise the 1st Battle-ship Division anchored off the town, while the 2nd proceeded to Mers-el-Kébir, and both completed with coal. The Reserve Division of the Mediterranean Fleet left Toulon on 12th July, proceeding to Algiers, where it arrived on the 14th.

The Commander-in-Chief, Vice-Admiral Gervais, hoisted his flag and embarked with his Staff on 7th July, on board the first-class battle-ship "Bouvet," and accompanied by the "Hallebarde" proceeded to Mers-el-Kébir, where he arrived on the following day.

THE STRATEGICAL MANŒUVRES: THE FIRST PHASE.

The Mediterranean Squadron represented a French naval force stationed off the Algerian coast during a period of strained relations with another Power preceding the opening of hostilities. A battle-ship squadron with a cruiser division was anchored at Mers-el-Kébir, a roadstead in Western Algeria in the bay opposite Oran, and distant about 230 miles from Gibraltar, as an advance force, while the bulk of the fleet was at Algiers, represented by the battle-ship division, consisting of the "St. Louis," "Charlemagne," and "Gaulois," under the command of Vice-Admiral de Maigret. The force at Mers-el-Kébir consisted of the battle-ships "Iéna" and "Jauréguiberry," each of which represented a division, under the command of Rear-Admiral Marquis, who had under his orders the Light Division under Rear-Admiral Boutet, which consisted of four armoured and four protected cruisers, with four destroyers.

On 7th July at 8 a.m. news was received of the declaration of war, and at the same time it was reported that an enemy's squadron had been sighted off the coast of Portugal steaming for Gibraltar, further it was known that the object of this squadron was to effect a junction with another force coming to meet it from the East. This junction the French Fleet had to prevent.

The Squadron of the North, under the command of Vice-Admiral de Courthille, represented the enemy, and at the time of the declaration of war he was lying off Lisbon; the admiral was free to attempt to break into the Mediterranean as suited himself, within the limits of time assigned for the operations, but he had to be off the Balearic Islands by 5 a.m. on 11th July; his object was to reach his rendezvous without being sighted, and if this was not possible, to avoid being drawn into an

action until his junction was effected with his allies. The speed of the battle-ships of the French Fleet was limited to 12 knots, that of Vice-Admiral de Courthille's squadron to 10 knots, while there was no restriction on the speed of the cruisers and torpedo-vessels. As far as can be gathered, the fighting value of Vice-Admiral de Courthille's ships was considered somewhat higher than that of the French, presumably as a set-off to their inferior speed; while the coast-defence ships were counted equal with the other battle-ships under his orders; his two armoured cruisers, the "Montcalm" and "Dupuy de Lôme," were also considered equal to the four of the de Maigret squadron, viz., the "Pothuau," "Latouche-Tréville," "Chanzy," and "Amiral Charner," and individually superior to any of them.

The Operations.—Hostilities opened at 8 a.m. on 7th July, and Rear-Admiral Marquis, who, as we have already stated, was lying with his force at Mers-el-Kébir, immediately despatched Rear-Admiral Boutet with his cruisers to get in touch with the enemy, and to communicate the fact of his having done so immediately to him. As the enemy's speed was known and the conditions to which he had to conform, Admiral Boutet was able to form an accurate idea as to when he would pass Gibraltar, so the interesting point of the problem was not so much the strategic question of getting in touch with the hostile force, which was certain, unless something unforeseen occurred, such as a fog in the Straits, as the disposition of the cruisers, so as to ensure communication with Mers-el-Kébir, and at the same time to guard against the chance of the weaker units being overwhelmed by the more powerful hostile cruisers, which would be opposed to them.

The disposition of the cruisers was ably conceived and showed the possibility of putting Mers-el-Kébir in direct touch with Gibraltar by means of a small number of ships; on the present occasion three échelons to pass on messages by wireless telegraphy, which could doubtless be reduced to two in the near future, were established, further communication being maintained by a swift despatch service between the nearest telegraph-ship and the port. The cruisers "Latouche-Tréville," "Du Chayla," and "Cassard" formed the telegraphic stations, the "Latouche-Tréville" being stationed somewhat to the east of Alboran Island, at a point about 100 miles distant from Mers-el-Kébir, while the "Du Chayla" and "Cassard" were posted further west in easy telegraphic communication with each other, the destroyer "Epingole" being attached to the "Latouche-Tréville" for despatch duty, while Rear-Admiral Boutet, with the remaining five cruisers at his disposal, proceeded west, steaming in line ahead, with his ships in the following order: "Pothuau," "Linois," "Amiral-Charner," "Galilée," and "Chanzy," as by this disposition he secured the protection of his

two weak small cruisers, the "Linois" and "Galilée," by their three armoured sisters. Passing Europa Point on the morning of the 8th, he then stationed himself some 20 miles further west off the mouth of the Straits. About 5 p.m. on the same day he sighted the enemy steaming in line ahead, with the two powerful cruisers "Montcalm" and "Dupuy de Lôme," one on each bow. Admiral Boutet immediately proceeded to manœuvre his cruisers so as to place himself astern of the enemy, which, owing to his superior speed, he was enabled easily to do, keeping his ships just out of range, although his two rear vessels came for a short time under a heavy fire from the enemy, but not sufficiently long to be placed by the rules out of action. In this connection it may be as well to point out that the opinion seems to be that Admiral Boutet's manœuvre was a somewhat rash one, and that in actual war his cruisers would have been severely punished. All through the night the French cruisers, Admiral Boutet leading in the "Pothuau," kept more or less in touch with the enemy, both standing to the east, and neither squadron showing any lights; towards midnight the "Pothuau" came unexpectedly under the fire of the enemy's rear division, which had eased speed unperceived and then turned their search-lights full upon the pursuing ships; altering her course, the "Pothuau" soon drew clear, but, for the time being, touch with the enemy was lost, Admiral de Courthille having altered the course of his squadron, as soon as the "Pothuau" and her consorts had been driven off, without being perceived; however, at daylight, Admiral Boutet found the enemy still in sight ahead of him.

In the meantime, about 11 p.m. on the 8th, the "Cassard," the most westerly of the three telegraph-ships, received the report that the enemy had been sighted, and transmitted it without delay to the "Latouche-Tréville," which in turn despatched the "Epingole" with the news to Mers-el-Kébir, where she arrived on the morning of the 9th, having been somewhat delayed by an accident to her machinery. Rear-Admiral Marquis had had his fires alight since the previous evening, and on receipt of the news immediately weighed with his two battle-ship divisions, and the torpedo-boats of the *défense-mobile* of Oran under the escort of the torpedo-aviso "Dunois," and shaped his course for Alboran; Vice-Admiral Gervais following in the "Bouvet" with the "Hallebarde." As the enemy's fleet approached, the line of communication cruisers gradually fell back, until at midday the "Latouche-Tréville" came in sight of the French main body; the "Du Chayla" shortly did the same, and as wireless telegraphy was now no longer effective, the messages becoming confused, owing to the commingling of the Hertzian waves, since the enemy's ships were also using this method of signalling, Admiral Marquis directed both cruisers to steam ahead and get into communication with the "Cassard" by flags; at 3 p.m.

the latter was sighted, and she immediately reported the enemy in sight. About 4 p.m. both squadrons were in full view of each other, and both shortly after formed line abreast; and in this formation, which enabled all the chase guns to be brought to bear, steamed towards each other, Admiral Boutet at the same time concentrating his whole Cruiser Division so as to afford Admiral Marquis what support he could. When within 5,000 yards of each other the "Formidable" opened fire, and Admiral Marquis, recognising that he was overmatched by the enemy, then altered the course of his ships together sixteen points, and taking advantage of his superior speed drew his squadron out of range; despatching the "Du Chayla" to Algiers to report the situation to Vice-Admiral de Maigret and requesting assistance, he then took up a position to starboard of the enemy, with the view of keeping in touch with him, and disposed his cruisers to act as a screen between himself and the hostile force. As evening fell both squadrons were now standing to the north-east, the enemy in line ahead with his two cruisers stationed one on each quarter; the French cruisers in close order out of range on the starboard quarter, with the two destroyers "Pique" and "Épée" between them and the enemy, on the look-out for any threatening move on the part of the "Montcalm" or "Dupuy de Lôme," while the "Dunois" with the *défense-mobile* of Oran hovered under shelter of the larger ships on the look-out for any opportunity there might be to attack. Touch was easily maintained during the early part of the night, thanks to the new moon, as it was quite fine, so the French seemed to consider that there was no chance of losing it, as Admiral de Courthille showed no sign of attempting to steal away; but after the moon set at 10 p.m., with a view of putting the French look-outs off their guard, his ships were ordered occasionally to show a small light somewhere for a few seconds, as if carelessly, and this trick seems to have succeeded, for about 11 p.m. he suddenly altered course back to the west, turning away from the French, a manœuvre which was not discovered by Admiral Boutet until too late, and although he immediately signalled to his ships to alter course in pursuit, the enemy had already disappeared in the darkness. The commander of the destroyer "Pique," who had at considerable risk hung closely on to the enemy, seems to have expected some such move, with the result that he was able to maintain his touch; the "Dunois" also managed to keep the enemy in sight during the night, but from some unexplained reason her torpedo-boats went completely astray. At daybreak on the 10th, Admiral de Courthille, seeing the "Pique" and "Dunois" alone in sight of the French Squadron, ordered the "Montcalm" to chase them off; this, of course, she succeeded in doing, but was unable to bring them under fire without losing sight of her own admiral, so when hull down she gave up the chase and

rejoined him, having steamed, however, sufficiently far to make certain that none of the French ships were in sight. Admiral de Courthille then once more shaped his course to the north-east well out of sight of the Algerian coast. The "Pique" in the meanwhile steamed off south-east to find Admiral de Maigret and report to him, while the "Dunois" proceeded to a rendezvous previously fixed by Rear-Admiral Marquis, who with the rest of his ships reached it about 10 a.m. the same day. The Rear-Admiral immediately despatched the "Du Chayla" to report to Vice-Admiral de Maigret the disappointing news that the enemy had eluded him, but before the cruiser had steamed many miles to the south-east she perceived the enemy to the southward steaming north-east, so altering her course, she communicated the information to Admiral Marquis, who once more took up the pursuit. His ships now were operating over a more extended line, and more than once his lighter vessels might have been cut off by the "Montcalm," but for some reason or other these chances were allowed to pass without advantage being taken of them. As evening came on, the enemy altered course to the north, steering towards Cape Palos, and Admiral Boutet, after the previous night's experiences, determined himself, in the "Pothuau," which was the most powerful unit in his division, to keep close touch with the foe, and this he succeeded in doing during the earlier part of the night, frequently exchanging shots with the hostile cruisers; but towards 3 a.m. Admiral de Courthille, suddenly changing his course to the east, again gave him the slip, and at daybreak Admiral Boutet and his division once more found themselves alone.

It was now the 11th, and as Admiral de Courthille in the meantime had shaped his course for his rendezvous, and hostilities came to an end by the regulations, at 5 a.m. the French fleet had to confess themselves defeated. Vice-Admiral de Maigret had learnt on the previous morning that Rear-Admiral Marquis was again in touch with the enemy, but knowing that hostilities had to cease in less than twenty-four hours, and that by no possibility could he reinforce his rear-admiral in time, he made no attempt to leave Algiers. At noon the whole of his fleet was once more assembled under his flag at Algiers, while Vice-Admiral de Courthille anchored with his ships off Mers-el-Kébir, at which two ports the two fleets respectively were to spend the fête day of 14th July.

The Reserve Squadron, consisting of the battle-ships "Brennus," "Carnot," "Hoche," "Masséna," with the torpedo-avisos "La Hire," under the command of Rear-Admiral Besson, with his flag in the "Brennus," left Toulon on the morning of Saturday the 12th, and arrived off Algiers at 6 a.m. on the 14th; the harbour being full, the division had to anchor in Agha Bay. The usual festivities connected with the celebration of the national holiday were held.

The SECOND PHASE.

The second phase of the manœuvres was devoted to tactical exercises of the whole fleet, under the immediate command of Vice-Admiral Gervais, which included battle tactics between the two squadrons under Vice-Admirals de Courthille and de Maigret respectively, and a bombardment of Bizerta.

At midnight of 15th-16th July the Mediterranean Squadron left Algiers, the battle-ships steaming at 10 knots, and the cruisers, which had weighed an hour earlier, at 12 knots, course being shaped towards a rendezvous some ten miles to the north of Cherchel, on the Algerian coast, where the Northern Squadron, representing the enemy, was expected on the following day, the 16th; the cruisers were extended to scout for the enemy, communication being maintained with the main body by means of wireless telegraphy. Vice-Admiral de Courthille, with the Squadron of the North, accompanied by Vice-Admiral Gervais in the "Bouvet" with the "Hallebarde," left Mers-el-Kébir at 1 p.m. on the 15th, with his cruisers, which were under the command of Captain Thomas of the "Dupuy de Lôme," on the look out on each bow, and shaped his course eastward; his cruiser division was temporarily strengthened by the "Amiral-Charner," and the torpedo-boats of the *défense-mobile* of Oran were also attached to his squadron.

Vice-Admiral Gervais had directed that both fleets were to engage when they came up with each other. The Mediterranean Fleet, with its nine battle-ships, was stronger than its opponent by three ships, and had the further advantage of 2 knots in speed, which was fixed at 13 knots, while the Northern Squadron was restricted to 11; all the battle-ships were counted of equal value.

The two fleets sighted each other in the morning, and Admiral de Courthille, who had previously been steaming with his battle-ships in an hexagonal formation, now formed into single column line ahead, which formation he maintained during the whole action, steering a course south; the torpedo-boat destroyers, torpedo-boats, and the three armoured cruisers taking station at first to starboard of the battle-ship line. Vice-Admiral de Maigret first formed his fleet into quarter-line, himself leading in the "St. Louis," and the other ships disposed to starboard; fire was opened by both fleets when within 5,000 yards of each other. When within 2,000 yards of the enemy Admiral de Maigret ordered his ships to turn together four points to port and form in line ahead, steaming on a course parallel to that of Admiral de Courthille, with his cruisers and torpedo-boat destroyers in two groups on his port beam; availing himself of his superior speed, he made several attempts to pass ahead and circle round the leading ships of his opponent, so as to bring them between two fires; but Admiral de Courthille managed,

occupying the inner circle as he did, to foil each attempt, and the result proved that a superiority in speed of 2 knots was not enough to permit of this tactical manœuvre being carried out. On more than one occasion during recent French manœuvres has this attempt been made to envelop an adversary and bring him under a double fire; but so long as he is prepared for it, unless the difference of speed is very great indeed, as he is moving through a much smaller radius, the manœuvre is not likely to prove successful. In the meantime, Captain Thomas, in command of the Northern cruisers, seeing his opportunity while the battle-ships were engaged, altered course suddenly, and, passing under the stern of the battle-ships, fell in succession on the separated groups of Admiral de Boutet's Light Division, and being both faster and stronger by the rules, would have infallibly crushed them in detail, broken up as they were and thrown into confusion by the unexpected attack. Admiral de Courthille now signalled for his destroyers and torpedo-boats to attack, and for a short time there was an indescribable *mêlée*, and what the results in real warfare would have been it is impossible to predict. At midday Admiral Gervais, who had been carefully following the battle in the "Bouvet," signalled for the fight to cease, and it would certainly appear that, despite his inferiority in speed and numbers, Admiral de Courthille came by no means unsuccessfully out of the engagement.

Following his usual custom when concentrating the manœuvre fleets under his personal command, Admiral Gervais formed the ships in four columns, as follows:—

No. 1. "Bouvet" (Commander-in-Chief), "Brennus" (Rear-Admiral Besson), "Hoche," "Masséna," "Carnot," with the torpedo-aviso "La Hire" as repeating ship.

No. 2. "Formidable" (Vice-Admiral de Courthille), "Bouvines" (Rear-Admiral Péphau), "Courbet," "Valmy," "Amiral-Tréhouart," "Jemmapes," with the "Cassini" as repeating ship.

No. 3. "St. Louis" (Vice-Admiral de Maigret), "Charlemagne," "Gaulois," "Iéna" (Rear-Admiral Marquis), "Jauréguiberry," with the "Dunois" as repeating ship.

4th, the Light Division. "Pothuau" (Rear-Admiral Boutet), "Chanzy," "Latouche-Tréville," "Charner," "Dupuy de Lôme," "Montcalm," "Du Chayla," "Cassard," "Linois."

During the afternoon of the 16th, tactical exercises were carried out, and at sunset the columns were extended to 10-milè intervals, and during the night following touch was maintained by means of wireless telegraphy and coloured signal rockets; during the three following days the fleet was exercised tactically, anchoring for the night at Bougie, Philippeville, and Bône, at which last port it remained at anchor during the 20th. Leaving again on the 21st, course was shaped

east towards Bizerta, and as evening approached the cruisers and destroyers were sent ahead to reconnoitre. The new fortifications were fully manned in readiness for the expected attack, and taking part also in the defence were the coast-defence battle-ship "*Tempête*," the armoured gun-boat "*Phlégéton*," and the torpedo-boats of the *défense-mobile*; the armoured ships lay at the entrance of the narrow channel leading into the harbour, while on the evening of the 21st the torpedo-boats were sent to sea to scout for the enemy. Admiral Gervais during the night kept his battle-ships some distance from the coast, some of the small cruisers and destroyers being extended as far as Galita Island as a screen against torpedo-boat attacks, while his own torpedo-boats were sent close in to ascertain the defence arrangements, etc. At 2 a.m. the cruisers opened fire on the forts, and various attacks and counter-attacks were made by the torpedo-flotillas on each side, which resulted in considerable confusion; on one occasion at least two of the torpedo-boat groups of Admiral Gervais's fleet were found attacking each other. Under these circumstances and as the boats of the attacking fleet were continually subjected to the fire from the forts under which they were brought by the powerful search-lights on shore, the attack could hardly be considered a success. At daybreak Admiral Gervais was observed from the fortifications steaming in with the main body of his fleet, which he had now formed in four divisions:—1, "*Bouvet*," "*Masséna*," "*Carnot*"; 2, "*Formidable*," "*Courbet*," "*Iéna*"; 3, "*St. Louis*," "*Gaulois*," "*Charlemagne*"; 4, "*Jauréguiberry*," "*Hoche*," "*Brennus*." At 6 a.m. Admiral Gervais opened fire, his cruisers having drawn off; each division passed along the front of the forts at a distance of some 2,000 yards, then turning seaward, returned to their former position, and again passed along the forts; these successive assaults were maintained for about three hours, and were supported to a certain extent by the fire from the cruisers, which, however, kept much further out. At 9 a.m. the action ceased by order of Admiral Gervais, and the fleet anchored in the bay. It would appear from the little that has been allowed to transpire, that with the completion of the new powerful land batteries Bizerta is considered safe from attack by sea, the batteries are well placed, and a heavy cross fire can be directed on any point, there being no dead sections.

THE THIRD PHASE.

General Idea.—As the object of the first part of the manœuvres was to test the strategical value of Mers-el-Kébir as an outpost for watching the Straits of Gibraltar, so the object of the second phase was to show the danger which threatens French communications between Toulon and Bizerta since the conversion of Maddalena by the Italian Government

into a strongly fortified naval base, lying as it does on the north point of Sardinia and commanding the Straits of Bonifacio.

France is at war with an Eastern Power. A French battle-ship division lies ready for sea at Bizerta, in order to effect a junction with a squadron which is being mobilised at Toulon. The division in Bizerta was watched by an equally strong hostile squadron, which on its side was in telegraphic communication with another squadron ready for sea lying in the harbour of Ajaccio.

The object of the manœuvres was to prove whether a French fleet in Bizerta could reach the French coast without being intercepted and compelled to engage one or both of the hostile squadrons, one of which was blockading Bizerta and the other in possession of Corsica.

The west coast of Corsica and Sardinia was in possession of the enemy, with Ajaccio as his principal fortified base, the Straits of Bonifacio were included in the limits of the manœuvre field, which was bounded on the west by a meridian drawn south from a point somewhat to the west of Toulon.

ORGANISATION OF THE FORCES.

FRENCH.

Vice-Admiral de Courthille.

A Squadron.

Battle-ships—"Formidable" (flag-ship of Vice-Admiral de Courthille), "Courbet," "Amiral-Tréhouart."
Light vessels—"Casabianca," "Yatagan," "Flèche."

Tunis Division.

Coast-defence-battle-ship—"Tempête."
Armoured gun-boat—"Phlégéton," and the torpedo-boats of the *Défense-Mobile*.

D Squadron.

Battle-ships—"Brennus" (Rear-Admiral Besson), "Hoche," "Carnot," "Masséna."
Torpedo-boat destroyer—"La Hire," with the torpedo and submarine-boats of the Toulon *Défense-Mobile*.

ENEMY.

Vice-Admiral de Maigret.

B Squadron.

Battle-ships—"Bouvines" (Rear-Admiral Pépau), "Valmy," "Jemmapes,"
Armoured cruisers—"Dupuy de Lôme," "Montcalm," "Amiral-Charner."
Cruisers—"Du Chayla," "Cassini."
Destroyers—"Durandal," "Fauconneau."

C Squadron.

Battle-ships—"St. Louis" (Vice-Admiral de Maigret), "Charlemagne," "Gaulois," "Iéna" (Rear-Admiral Marquis), "Jauréguiberry."
Armoured cruisers—"Pothuan" (Rear-Admiral Boutet), "Chanzy," "Latouche-Tréville."
Cruisers—"Cassard," "Linois."
Destroyers—"Dunois," "Épée," "Espin-gole," "Pique," with the torpedo-boats of the Corsica *Défense-Mobile*.

CHIEF UMPIRE.

Vice-Admiral Gervais, in the "Bouvet," with the "Galilée," and "Hallebarde" as despatch-vessels.

All the battle-ships were of equal fighting value.

Vice-Admiral de Courthille with the A Squadron was in Bizerta; Rear-Admiral Besson with D Squadron in Toulon, the mobilisation of

which was to be completed by the 1st August. Vice-Admiral de Maigret with C Squadron was in Ajaccio, while on Rear-Admiral Péphau (with the B Squadron) rested the duty of blockading A, which had to attempt to form a junction with D at Toulon. The speed of the battle-ships of C Squadron was fixed at 15 knots, that of the remainder at 10 knots, no restriction being placed on the speed of the cruisers.

Hostilities began at 6 p.m. on the 28th July, on which day all four squadrons had taken up their assigned stations. While D Squadron was proceeding to Toulon, the opportunity was taken by the torpedo-boats of the *défense-mobile* of Corsica to essay an attack. This was done when the squadron was off the Straits of Bonifacio; the "Brennus" was considered to have been torpedoed, but the bright moonlight enabled the other ships to beat off their assailants.

It is evident that the task assigned to Admiral de Courthille was by no means an easy one. He had to force his way out of Bizerta in face of a blockading squadron, which although only his equal in battle-ships, had in addition at its disposal three powerful armoured and two large protected cruisers; then with his three battle-ships, without any cruisers to mask his movements or obtain information for him, he had to steam 400 miles to Toulon, with his flank threatened by the C Squadron lying at Ajaccio, which was superior to him, not only numerically, but had the further advantage of five knots over him in speed. It is difficult to understand why this excessive superiority in speed was given to the C Squadron, as there is no such disparity in speed between the first-class battle-ships of any other nation and the French in these days. D Squadron could do nothing to assist A until it arrived off Toulon. It only remained therefore for Admiral de Courthille to try and effect his breaking out of Bizerta in such a way as to give him a sufficient start over the pursuing B Squadron, as would enable him to avoid being forced to give battle; and then to choose a course, which would put as much sea-room as possible between himself and the hostile force at Ajaccio, and between that force and its ally B, so as to make it as difficult as possible for B to keep touch with him, and at the same time maintain its communication with C. It was with this end in view that Admiral de Courthille made his dispositions, and fortunately he was aided, through the action of Rear-Admiral Péphau in anchoring his battle-ships so far, as he did, from the port he had to blockade. Bizerta had only one exit, and if the enemy was to be prevented from breaking out, it could only be by the blockading force remaining off the harbour, and it is difficult to understand what influenced Admiral Péphau in his decision, unless it was an exaggerated fear of a torpedo-boat attack.

On the evening of the 28th, Rear-Admiral Péphau with B Squadron anchored his battle-ships in Porto Farina Bay, some 20 miles east of Bizerta,

out of range of the fortifications of Tunis, keeping in touch with his cruisers by means of wireless telegraphy. The cruisers, viz, the "Montcalm," "Dupuy de Lôme," "Amiral-Charner," "Du Chayla," and "Cassini" were watching Bizerta, out of range of the guns of the batteries, while the destroyers closer in kept a look-out for any attack by the torpedo-boats of the blockaded squadron. At 11 p.m., Vice-Admiral de Courthille ordered the Tunis Division with the torpedo-boats to drive off the enemy's cruisers, which they effected, he himself putting to sea at 11.30 p.m.; but he was sighted, nevertheless, as soon as he was clear of the land, by the hostile cruisers, and the "Cassini" was despatched with the intelligence to Admiral Péphau, while the others proceeded to keep in touch with the French fleet. Admiral Péphau at once telegraphed to Admiral de Maigret at Ajaccio the information that the French squadron had broken out of Bizerta, while he himself weighed and followed. Admiral de Maigret received the intelligence at Ajaccio at 3 a.m. on the 29th, and immediately despatched his cruisers to scout along the Sardinian coast, with orders for them to steam at the same speed and to keep in wireless telegraphic communication with each other; the cruisers were extended in the following order:—"Cassard," "Chanzy," "Latouche-Tréville," and "Pothuau," each being accompanied by a destroyer as despatch-vessel. The "Cassard," which headed the line, in accordance with her orders, shaped a course southwards direct for Bizerta, while the "Du Chayla," of B Squadron, having ascertained the direction the French squadron were taking, proceeded north at full speed to communicate with Admiral de Maigret's cruisers, but it was not until the evening of the 29th that she got in touch with the "Cassard." During the night of the 28th-29th, and the following day and night, Admiral Péphau, with B Squadron, maintained his touch with the enemy, but not without some risk to his cruisers, which were leading; Admiral de Courthille, however, was only anxious to reach his rendezvous at the Hyères Islands, and kept steadily on his course, it not being worth his while to risk an engagement with his pursuers, who were his equal in force. There is some discrepancy in the reports of the operations as to what actually took place, but probably the account furnished by M. Pier-reval, who seems to have been on board the "Bouvet," to the *Moniteur de la Flotte* is the accurate one. According to him, Vice-Admiral de Maigret weighed at 2 a.m. on the 30th, having received from the "Pothuau" the information transmitted through the chain of cruisers from the "Du Chayla" as to the movements of the French fleet; and shaped his course at first south-west to communicate directly with the "Pothuau," and then to the north-west so as to intercept A Squadron; in the morning he was still receiving reports through his cruisers, but valuable

as had been the aid given by the wireless telegraphy, by which he had been kept in touch with Admiral Péphau, there had been so much delay in getting messages through, that at 8 a.m. Admiral de Maigret found himself under the necessity of steaming at the highest speed permitted him, 15 knots, if he was to succeed in intercepting A. Admiral de Courthille in the meantime was continuing his course steadily for the Hyères Islands, with Admiral Péphau's division of armoured cruisers keeping astern of him just out of range, astern of them again in signalling distance were the battle-ships of B Squadron, while in full view on the starboard bow was the "Cassard," telegraphing through the chain of cruisers every movement of A Squadron to Admiral de Maigret; nevertheless had the speed of Admiral de Courthille's squadron been anything near that of Admiral de Maigret's he would have made good his escape, but an inferiority of 5 knots was too great a handicap, whilst also labouring under the disadvantage of having no cruisers to screen his movements, so soon after midday he found himself confronted with the C Squadron under Admiral de Maigret in line of battle ahead of him, thus placing him between two fires; at this juncture Vice-Admiral Gervais, as he was empowered to do, joined himself with the "Bouvet" and small cruiser "Galilée" to de Courthille's force, but even then the disparity between the two fleets was too great, so Vice-Admiral Gervais temporarily stopped the operations, and assuming the command, decided on another theme of action for the coming night.

Continuing himself with A Squadron, he now attached to it the two powerful armoured cruisers "Montcalm" and "Dupuy de Lôme," temporarily withdrawing them from Rear-Admiral Péphau's division; at the same time he united B and C Squadrons under Vice-Admiral de Maigret. Forming A Squadron into single column in line ahead he shaped course towards the North, pursued by B and C, whose cruisers had orders to endeavour to keep in touch with A, fighting if necessary the "Montcalm" and "Dupuy de Lôme," which in their turn were to drive them off sufficiently far to make them lose touch. Both fleets were to use their destroyers for attacking and torpedoing their adversaries where possible. The ships steamed without their usual lights, but each ship carried a small light astern, which seems to have been an unnecessary precaution, and moreover rendered the work of the pursuing cruisers in keeping touch comparatively easy, although they several times came under their opponents' fire; towards morning, the "Montcalm" and "Dupuy de Lôme" managed to so far check the pursuing vessels, that had darkness lasted another quarter of an hour A would have been out of sight; as it was, when day broke, the ships were just visible on the horizon. Several attacks were made by the destroyers of B and C, but were considered unsuccessful.

The next morning, the 31st July, Vice-Admiral Gervais re-assembled the whole fleet under his own command, forming the ships into three columns, and tactical exercises were carried out, until interrupted by the coming on of a fog; course was then shaped for the Hyères Islands, but at 11 a.m. the weather cleared again, and Vice-Admiral Gervais once more re-formed the fleet into the A, B, and C Squadrons, in order to complete the original strategic theme. He himself with the A Squadron proceeded to and anchored in Hyères roadstead, where D Squadron, from Toulon, was to attempt to effect a junction with him, which B and C were to prevent. While A Squadron was proceeding to take up its position in the anchorage, B and C lay to in order to coal the "Jemmapes"; this was effected by each of the battle-ships lowering boats, which were filled with briquettes and towed to the "Jemmapes"; the weather was calm, so no difficulty was experienced, and the whole operation only took two hours and a half. As soon as it was completed Admiral de Maigret steamed slowly towards Hyères anchorage, cruising off the port, but keeping out of range; the destroyers were thrown out between the line of battle-ships and cruisers and the shore as a screen against torpedo-boat attacks. At sunset, Admiral de Maigret made his arrangements for blockading the port during the night, and for this purpose formed his squadron into three groups. The first, consisting of the battle-ships of A Squadron, cruised ten miles to the south of the principal channel; the second, composed of the armoured cruisers, kept guard at the same distance between the Island of Porquerolles and Toulon; the third, consisting of the remaining battle-ships, were stationed fifteen miles to the south of the eastern channel. No lights were shown, and the crews of the light guns were kept ready in case of attacks by torpedo-boats. The channels were also closely watched by the lighter cruisers; the "Cassard," with the "Espingole" kept watch between Titan and Cape Binat; the "Linois" before the principal channel; the "Épée" before that of the Grottes; the "Pique" and "Dunois" off the small western channel in sight of Toulon roadstead. On their side the French squadron took all precautions against a torpedo-boat attack, booms being thrown across the channels, as it was known that the torpedo-boats of the Corsican *défense-mobile* had reached the coast of Provence and were operating with the enemy's force; so the ships were anchored in two divisions, the one under shelter of Porquerolles Island, the other well within the bay, while the destroyers and steamboats patrolled the channels, the former throwing their search-light rays continually across the waterways. The torpedo-boats of the *défense-mobile* of Toulon with the "Dragonne" had arrived at the anchorage, and during the night they made several attempts to attack the blockading ships, but without success. The next

day, August 1st, the blockading fleet bombarded the works on Porquerolles Island, but the exercise seems to have been carried out mainly for the instruction of the gunners in the forts. During the ensuing night the enemy's torpedo-boats attempted an attack against the division of the French fleet anchored under Porquerolles Island, but they were unable to force their way through the channel. The critical point of the operations was now, however, about to be reached, for shortly before daylight on the morning of the 2nd, D Squadron left Toulon, and, although immediately sighted, and the blockading cruiser signalled the information at once to Admiral de Maigret, before that admiral could close to intercept him Rear-Admiral Besson had effected his junction with A, and Admiral de Courthille immediately put to sea with his now united fleet, forming his seven battle-ships into single column in line ahead, and steamed to the westward past Porquerolles Island. In the meantime, Admiral de Maigret was also concentrating his ships, and seems to have formed his fleet at first in two columns with the ships disposed to port, the leading column consisting of six battle-ships, the rear of five, which filled the intervals between the ships of the leading column; he was thus approaching the French fleet at right angles, but when within 5,000 yards and both sides opened fire, Admiral de Maigret turned his ships together eight points to starboard, bringing his fleet now into two columns in line ahead, the ships of the starboard column forming an indented line with the port. There seems to have been some redistribution of the cruisers, when A Squadron took up its anchorage in the Hyères roadstead, for in the meagre account of the action on the 2nd we are told that Admiral de Maigret had his armoured cruisers divided into two groups, one under the command of Rear-Admiral Boutet and the other under Captain Thomas of the "Dupuy de Lôme," which at first were stationed somewhat astern of the battle-ships on each quarter. No information is forthcoming as to the speed allowed the two opponents, but presumably, as before, Admiral de Maigret had the superiority, as he seems to have been able to take up a position from which he could concentrate his fire on the leading ships of Admiral de Courthille's line; while the battle-ships were thus engaged, the armoured cruisers circled round and attacked the rear ships of the French line. Finding himself thus at a disadvantage, Admiral de Courthille made his fleet alter course together sixteen points, bringing the cruisers under the fire of his starboard guns, forcing them to draw off to a distance, at the same time he came under the protection of the guns from the forts on the Giens Peninsula; at this point Admiral Gervais made the signal to cease the action. During the fighting the torpedo flotillas on both sides made some well-carried-out attacks, but these could only be considered in the light of exercises in handling these little vessels, as it is impossible to believe that attacks of that kind in broad daylight could

ever be really pushed home in face of the fire to which they must have been exposed. It may also be noticed that the unarmoured vessels took no part in the action.

Vice-Admiral Gervais then resumed command of the whole fleet, which was again re-formed into its four columns, after which he proceeded and anchored in the Hyères roadstead.

On the 4th August the Commander-in-Chief again took the fleet to sea for tactical exercises. A new battle formation seems to have been tried; the fleet being formed in two divisions, the fastest ships forming the rear one, the idea being that the leading division should engage the enemy, holding him in check, while the rear division, taking advantage of its superior speed, should circle round and bring him between two fires. In practising this evolution the rear division was manœuvred at a speed of 15 knots, and Vice-Admiral Gervais seems to have been very much pleased with the skill and precision with which the movements were carried out. In the evening the fleet again returned to its anchorage. Next day it again put to sea, and the "Dupuy de Lôme," with six of the smaller cruisers, under the command of Captain Thomas of the first-named ship, was first sent ahead to a rendezvous some fifteen miles south of the Hyères Islands, to represent an enemy's battle squadron. Admiral Gervais divided his fleet into two squadrons, the first composed of his own flag-ship, the "Bouvet," with the battle-ships of the Atlantic Fleet and those of the Reserve Squadron, in all eleven ships, formed in two columns in indented order, with the ships at first disposed to port; while the second squadron was composed of the five battle-ships of the Mediterranean Fleet, in line ahead, in rear of the centre of the first squadron; while the armoured cruisers were in two groups, one on each quarter of the second squadron. Towards midday the enemy was sighted, and both fleets formed order of battle, the enemy in a single column in line ahead, while Admiral Gervais, altering the course of his ships together eight points to starboard, bringing them into columns in line ahead, still in indented order, steered a course which brought him parallel to the van and centre of the enemy's line, the indented formation enabling him to bring all the broadside guns of his ships to bear. At the same time the second squadron were ordered to steam at 15 knots, and, passing round the stern of the enemy, take up a similar position on his port beam and bow to that occupied by the first squadron on the starboard side. The speed of the enemy and Admiral Gervais's first squadron was limited to 12 knots, but even with this advantage of three knots it took the second squadron some time to gain its assigned position, although, of course, it was enabled to subject the enemy to a galling raking fire as it crossed astern of his course. At the same time the two divisions of armoured cruisers, whose speed was not restricted, were

ordered the one to attack ahead and the other astern, while the torpedo-boats of the *défense-mobile* of Toulon, under cover of the battle-ships of the first squadron, made several attempts against the enemy; but it is extremely doubtful if any of them could ever have got near enough to launch a torpedo. The final fighting distance of the squadrons seems to have been less than a thousand yards, and at the end of the exercise the enemy was completely surrounded.

These last tactical exercises brought the manœuvres of the combined fleets to an end; the next day they anchored at Toulon, and the dispersal of the different squadrons followed.

Concluding Remarks.—M. Pierreval has some interesting remarks to make, with regard to the conclusions he has arrived at as to the lessons which have been learned. Premising his remarks with the statement that the country has every reason to be proud of the manner in which the manœuvres were carried out, he observes, in the first place:—"The operations of the second and third periods might be described as 'the Line Ahead on its Trial.' Previous manœuvres had already shown the difficulties of handling a large squadron in this formation, owing to the great length of the line. The problem, therefore, is to discover some equally workable but at the same time closer formation. The solution offered by the double column formation is only satisfactory from the point of view of its handiness, as a fleet so formed can be manœuvred as rapidly and with as much certainty as if in single column; but it has two disadvantages which are fatal to it in the eyes of a considerable number of naval officers. The first is that the ships in the column furthest from the enemy are liable to have their fire masked for an appreciable time, while approaching the enemy, and that, just when as heavy a fire as possible is of the first importance; secondly, the formation being of greater depth, gives the enemy greater opportunities for making his fire effective. It is at once a formation less powerful for offence and more vulnerable than the single column, except in the case when an enemy may be crossing at right angles; but that is only a phase in an action. Nevertheless, this formation should be carefully studied, as, in spite of inconveniences, it is perhaps the only method of concentrating for the rapid destruction at all hazards of a settled objective. If it cannot be described as a "rational battle formation," it has at least served to show the necessity of closing up the single column by lessening the normal intervals between the ships, and without doubt it is in that direction that our admirals will in the future direct their efforts.

"The employment of distinct groups *en échelon* according to the speed and fighting power of the ships led to many combinations, of which some were particularly brilliant; such was the oblique attack of the armoured cruisers of A and B on the rear vessels of the French line

in the action off the Hyères Islands, and the envelopment of the head of the enemy's line by Admiral Boutet's division on 5th August, although this was made possible only by the exaggerated difference of speed laid down.

"On the other hand, we may ask if it is possible to lay down any strict rule in regard to battle formation? Many formations have been tried, and the aptitude that has been shown in realising at once the intention of the Commander-in-Chief is the best guarantee that the commanders of our ships and squadrons will adapt themselves to the circumstances that will arise in actual battle.

"The strategical scheme assigned a very important rôle to long-distance communication. Wireless telegraphy appears to have made decisive progress since last year. It was the means of communication constantly employed by the chains of cruisers, and has reached a development far in excess of what has been previously attained, and is to-day of real practical value in scouting. There is, however, one important point to be noted: it is greatly to be desired that the distances between the *échelons* should be increased, but this apparently cannot yet be done; and the delicate question of 'syntonism,' or the particularisation of messages, has yet to be solved.

"In the work of scouting, the cruisers gave proof of good training and of a clear comprehension of their duties, but it was otherwise when touch had to be maintained at night. This, however, was the first occasion upon which such exercises have been attempted under conditions so nearly approaching those of actual war. It is not surprising, therefore, that faults were committed, and these were of two kinds, viz., where touch was not kept at all, and where vessels were exposed at short range to the fire of an adversary better armed and better protected, without any account being taken of the difference in strength. The night operations had a great influence on the development of the two themes; they afford, especially to the stronger side, many opportunities for combinations, and the squadron which knows best how to take advantage of the night will have an immense advantage; but it is here that special training is required.

"In the night operations the torpedo-boats played but an unimportant rôle, and but little progress seems to have been made since last year in learning how to handle them. The exercises of the *défenses-mobiles*, such as those for example carried out when they were inspected by Admiral Fournier, have always been brilliantly executed, but this is far from being the case when they have taken part in the operations of mimic war. This would seem to show that the training of the torpedo-boats is too conventional, and does not take sufficiently into

consideration the realities of war; the consequence is, they do very well when moving in the circle of their accustomed routine, but, if called to act outside that, they are immediately demoralised. The *défenses-mobiles* are above all schools of pilotage and not schools of preparation for battle; they have made what are mere accessories their principal object and have quite lost sight of the fact that they will have to fight almost entirely at night, while as a rule all their exercises are carried out by day.

"From the strategical point of view, account must be taken of two remarkable results:—The observation kept on the Straits of Gibraltar by a naval force stationed at Mers-el-Kébir, and that on the channels to the south of Sardinia by a squadron stationed at Ajaccio. The importance of these two strategic positions, where we have not as yet even coal depôts, have been clearly demonstrated; and it is necessary that they should be made real *points d'appui* for our squadrons, instead of being merely temporary and not very secure anchorages as in the case at present. On the other hand, the defences of Bizerta now seem formidable, but although rapid progress is being made, the arsenal is far from being as yet a fit base for a large fleet. There are difficulties in maintaining there a large stock of coal, and that which is there is dear and of poor quality. The defences of Salins d'Hyères, on the other hand, are in a satisfactory condition.

"The submarines had no opportunity of showing what they could do. The attacks that they attempted while the blockading squadrons attacked the forts of Hyères roadstead failed, though the boats remained undiscovered. Their low speed renders them inefficacious against ships under way and manœuvring, as they are unable to follow their movements, and they had no opportunity of defending channels or attacking ships at anchor."

THE VOYAGE OF THE "CHARMING NANCY,"

1776.

By Colonel F. A. WHINYATES, late R.H.A.

DURING the American War of Independence an Army under General Burgoyne, in the spring of 1776, was sent from England to Canada with the object of driving the rebels from that Province, and moving down the River Hudson to co-operate with the British troops in the neighbourhood of New York under the command of General Sir William Howe. Six companies of Royal Artillery accompanied Burgoyne's force, and one of them, under Major Griffith Williams, made the voyage across the Atlantic in the Ordnance transport the "Charming Nancy." The officers on board by mutual consent drew up a code of rules for observance during the passage. They are written in a little paper-covered book, at the other end of which is the diary of the voyage to the St. Lawrence in 1776. The cover is signed "George William, 27th March, 1776," and gives the routine account of weather at sea in April and May, 1776. On 30th May, the transport made the Island of Bic in the mouth of the St. Lawrence.

The rules referred to, which are both quaint and amusing, may be of interest to readers of the JOURNAL, and run as follows :—

Regulations of the United Assembly on board the "Charming Nancy," 3rd April, 1776.

The United Members of this Assembly hereby severally enter into a solemn engagement to forget and bury in eternal oblivion all animosities, bickerings, piques, sarcasms, witticisms, griping, or whatever tends or may tend to sow the seeds of discord, or disturb the harmony of this Assembly, and as the only means of preserving the mutual welfare of the whole, now come to the following Resolutions, binding themselves severally at the same time not only to observe the regulations at the peril of several weighty and severe penalties, but to see these penalties inflicted on the offending members according to the strictest sense of the following Resolutions :—

Resolved I.

That whatever Member presumes either designedly or wilfully to say any crooked word so that it should gripe brother Member, and should the griping member retort in such a manner by words or gestures that it should appear to this Assembly that he himself is very much griped, he is to be purged by gravel administered to him by the Carpenter.

Resolved II.

That no word shall be adjudged a crooked one till determined so by the general voice of this United Assembly, and if then a griping or griped Member shall not acquiesce in the general determination—Coventry dead.

Resolved III.

That as it appears conducive both to the order and health of this Assembly that no one be abed after eight o'clock (except he is much indisposed), at that hour all hammocks are to be struck and the cabbin cleared by nine, after that hour no washing, shaving, or shifting to be allowed. The Officer of the Day is to see the cabbin clean and decent both before and after breakfast, which he is to administer a quarter after nine at furthest, with the politeness of Sir Clement Cotterel. The said Officer is likewise to administer either tea or coffee at half-past five o'clock in the afternoon; he is likewise after each repast to see the several utensils washed and laid in the cleanest manner. Any Member offending against the regulation—Coventry dead.

Resolved IV.

That no one is to be allowed to make a riot or disturb the repose of any Member before eight o'clock, on pain of being stuffed with gravel.

Resolved V.

That no one is to presume to make punch as long as the Master is willing to make it, and that an account of all wines and sea stock in general to be kept by Old Tapester.

Resolved VI.

That this Assembly are not to exceed four bottles of wine at dinner, and two at supper without the permission of Old Tapester.

Resolved VII.

That no Member be permitted to hang out, put out, or produce anything indecent in the cabbin, on penalty of a severe reprimand from the President for the first offence, for the second offence to be drenched with salt water, and the third—Coventry dead.

Resolved VIII.

That if it appears to this Assembly that any one Member is in coske-cutting stile he shall be first drenched with a bottle of salt water, and if it should appear then that he is griped, the Carpenter is to administer him a dose of gravel; if that won't cure him—Coventry dead.

Resolved IX.

That no Member finding himself ill disposed, or unfit for company, be permitted to hang up his cott and retire (without) having made an apology to the company.

Resolved X.

That no game or rubber be begun after nine o'clock at night without the general consent of the United Assembly.

Resolved XI.

That any Member be permitted to relate a merry story, and that the other Members may laugh at him and his story without the least impeachment either of his character or veracity; and should it appear that he is any ways griped after the expiration of five minutes, he is to be asked if he chooses gravel or anything to scour his maw; but should he return to his former good humour, the Assembly will receive him with open arms.

Resolved XII.

That Old Tapester be appointed keeper of the records.

By Order of the General Assembly,

G. WILLIAMS, President.

D. DURNFORD, Secretary.

Present: Major Williams, president; Captain Day, Commissary; Lieutenant Durnford, Engineer; Clieland, Cox, Remmington, Lieutenants of Artillery; George Williams, Volunteer; John Bell, Master.

A few words concerning those mentioned will add to the interest of the rules of the General Assembly. Major Griffith Williams (131)¹ distinguished himself during Burgoyne's campaign, especially at the action of Still Water, 7th October, 1777, upon which day he kept his guns in action until the Artillery horses were all destroyed, and his men either killed or wounded, and he himself taken prisoner. Lieutenant Molesworth Clieland (460) was killed in the action at Skenesborough, 6th July 1777. Lieutenant Remmington (Samuel Rimington) (477) died a general officer in 1826. Lieutenant William Cox (485) left the R.A. in 1778, and joined the 21st Regiment. Lieutenant Desmaretz Durnford, R.E., served for two years in North America, and subsequently at the Cape and in India. George Williams, volunteer, was a nephew of Major Griffith Williams; he carried the flag of truce from General Burgoyne to General Gates on 13th October, 1777, previous to the capitulation of the British force. After his return home he entered Parliament, was member for Ashton-under-Lyne, and J.P. for Lancashire; died 1805. Sir Clement Cotterell, son of Sir Charles Cotterell, Master of the Ceremonies, succeeded his father in that appointment, and was vice-president of the Society of Antiquaries, and well skilled in matters of proceeding and ceremony. He took the added name of Dormer. The Cotterell-Dormers are still in existence.

¹ The numbers against the names of the Artillery officers are those by which they are known in Kane's List of R.A. officers, which dates from 1689 up to the present time.

NAVAL NOTES.

HOME.—The following are the principal appointments which have been made: Vice-Admiral—A. D. Fanshawe to be Commander-in-Chief in Australia. Rear-Admirals—R. N. Custance, C.M.G., to be Second-in-Command of the Mediterranean Fleet; W. H. Fawkes, C.V.O., to command of Cruiser Squadron. Captains—H.S.H. Prince Louis of Battenberg, G.C.B., G.C.V.O., to be Director of Naval Intelligence; F. S. Inglefield and S. Nicholson to be Assistant-Directors of Naval Intelligence; R. P. Purefoy, M.V.O., to "Royal Arthur"; H. G. King Hall, D.S.O., to be Principal Transport Officer at Cape Town; S. H. Carden to "Magnificent"; F. G. Kirby to "Ramillies"; C. J. Baker to "Flora"; A. J. Horsley to "Northampton"; F. D. Sturdee, C.M.G., to "Minerva"; R. C. Prothero, C.B., to "Implacable."

Vice-Admiral A. D. Fanshawe has been selected to succeed Vice-Admiral Sir A. L. Beaumont, K.C.M.G., as Commander-in-Chief in Australia, and will be the first officer of his rank to hold the command; he will hoist his flag in the first-class cruiser "Royal Arthur," which will probably remain as flag-ship on the station until her period of service is completed, which will not be for nearly two years. Rear-Admiral W. H. Fawkes, C.V.O., has been appointed to the command of the Cruiser Squadron, and will hoist his flag on board the new first-class cruiser "Good Hope," which commissioned at Portsmouth on the 8th inst. for this purpose. Rear-Admiral R. N. Custance, C.M.G., has been appointed to succeed the late Rear-Admiral Burges Watson as Second-in-Command in the Mediterranean, and will hoist his flag in the new first-class battle-ship "Venerable," which commissioned on the 12th inst. at Chatham; Rear-Admiral Custance will be succeeded at Head of the Intelligence Department by Captain H.S.H. Prince Louis of Battenberg, G.C.B., G.C.V.O. Rear-Admiral Sir W. Dyke Acland, Bart., hoisted his flag as Admiral Superintendent of Gibraltar Yard on the 30th ult., on board the "Cormorant." The second-class cruiser "Intrepid" commissioned at Portsmouth on the 2nd ult. to relieve the third-class cruiser "Barham" in the Mediterranean, and left on the 14th ult. for her station. The third-class cruiser "Calypso" left Devonport on the 2nd ult. for St. John's, Newfoundland, where she is to become drill-ship for the Naval Reserve. The first-class cruiser "Crescent," lately from North America and the West Indies, paid off on the 3rd ult. at Portsmouth. The second-class cruiser "Latona" commissioned on the 14th ult. at Portsmouth as the depot-ship for submarines. The first-class cruiser "Terrible" paid off on the 28th ult. at Portsmouth. The second-class cruiser "Flora" is to be commissioned to relieve the "Phaeton" in the Pacific. The Cruiser Squadron under the command of Commodore Winsloe, consisting of the "St. George," "Juno," and "Brilliant," arrived at Portsmouth from the Mediterranean on the 17th ult., the "Rainbow" parting company the previous day for Plymouth.

The first-class battle-ship "Hood," Captain R. S. Lowry, which met with an accident during the recent manoeuvres off the coast of Greece, arrived at Plymouth on the 28th ult., escorted by the cruiser "Sutlej." The "Hood" was

attached to the Mediterranean Squadron, and in the manœuvres served with the X Fleet. While this fleet was endeavouring to evade a blockade at Argostoli, the "Hood," being very close to the next vessel ahead, had to go full speed astern, and in doing this grounded and smashed her rudder boot so badly that she had to be left behind. The "Hood" was escorted as far as Gibraltar by the first-class cruiser "Hogue," and from Gibraltar home by the "Sutlej." It is noteworthy that the "Hood" was navigated the whole way from Argostoli by means of her twin screws alone, entering and leaving Malta, Gibraltar, and Plymouth Sound without any assistance whatever, thus establishing a perfectly unique record. The "Hood" will be paid off at Devonport, where it is probable the damage will be repaired.

The Cruise of the "Good Hope."—The first-class cruiser "Good Hope" (flag-ship of Rear-Admiral Fawkes) has been selected to convey Mr. Chamberlain to the Cape; it is understood she will leave Portsmouth on the 25th inst., proceeding to Durban *via* the Mediterranean and Suez Canal, where she is due to arrive on 20th December. According to present arrangements, Rear-Admiral Fawkes will hoist his flag and make the trip in the ship. She is due at Port Said on 3rd December, Suez 6th December, and she will also call at Aden and Zanzibar. She left Spithead on the 12th inst. to carry out her commissioning trials, which will last three days.

Steam Trials.—The new first-class battle-ship "Duncan" has completed her trials successfully, and the official results have been published. During her full-power trials the mean speed on five runs on the measured mile were 19.11 knots. The following table gives the principal details of each trial :—

	30 hours, 3,600-I.H.P.	30 hours, 13,500-I.H.P.	8 hours full power, 18,000-I.H.P.
Draught of water—forward	26 ft. 2 in.	26 ft. 2 in.	26 ft. 2 in.
Draught of water—aft	26 ft. 11 in.	26 ft. 11 in.	26 ft. 11 in.
Steam pressure in boilers, per square inch ...	213 lbs.	270 lbs.	291 lbs.
Vacuum in condensers—starboard	26.5 in.	25.7 in.	25.4 in.
Vacuum in condensers—port	27.5 in.	26.9 in.	26.5 in.
Revolutions per minute—starboard	72.3	110.8	120.5
Revolutions per minute—port	72.6	111.6	121.1
Mean I.H.P.—starboard	1,941	6,939	9,196
Mean I.H.P.—port	1,814	6,778	9,036
Total I.H.P.	3,755	13,717	18,232
Speed, by log	11.9 knots	18.1 knots	18.9 knots

The "Duncan" was built by the Thames Shipbuilding Company, Ltd. The vessel will now be completed for sea at Chatham.

Launch.—The new first-class armoured cruiser "Cornwall" was launched at Pembroke on the 29th ult., the naming ceremony being performed by Lady St. Germans, for which she was nominated by the Earl of Mount Edgembe, Lord-Lieutenant of Cornwall, in pursuance of an arrangement made at the wish of the King, who desires to arouse in connection with his Navy a territorial interest, similar to that which attaches to certain units of his Army.

The "Cornwall" is a first-class cruiser of the "Monmouth" class. Her principal dimensions are :—Length between perpendiculars, 440 feet; extreme beam, 66 feet; mean load draught, 24 feet 6 inches; displacement, 9,800 tons. The ship is built on the combined transverse and longitudinal system of framing in the central part, the

frames being plated both internally and externally. Alongside the keel on each side five strakes of steel plates are worked so as to add strength to the ship's structure. Vertical side armour varying from 4 inches in the thickest part to 2 inches thick at the bow extends for about three parts of the ship's length between the lower and the main decks, and when it terminates aft an athwartship bulkhead plated with armour 3 inches thick crosses the ship, and with the side armour forms what might be termed a citadel, and encloses most of the vital parts of the ship. Aft the armour bulkhead the lower deck is constructed of two plates, each 1 inch in thickness. The main deck from the same point is formed of one thickness of $\frac{3}{4}$ -inch plate only. The upper and forecastle decks are plated with steel and will be covered with wood. On the forecastle deck, 50 feet or 60 feet from the bow, and on the upper deck aft shallow circular barbettes formed of armour 3 inches thick have been constructed to carry the principal guns. The ship will be propelled by two independent sets of vertical triple-expansion engines, each of 11,000-H.P., and each having four cylinders. Steam will be supplied from 24 Babcock & Wilcox wafer-tube boilers, the working pressure of which will be 270 lbs. to the square inch. The gunmetal propeller blades, three in number on each shaft, can be set to three different pitches. The vessel will be armed with fourteen 6-inch B.L. guns, four mounted by pairs under shields in the barbettes and ten singly in the ten casemates, eight 12-pounders and three 3-pounder Q.F. guns, eight Maxims, and two boat and field guns. Two submerged torpedo-tubes are to be fitted, and the ship will carry seven 18-inch Whitehead torpedoes and five 14-inch torpedoes for use in the boats. The original estimated cost was £761,449, of which there will have been spent by 31st March next £529,715. The ship was laid down on 11th March, 1901, and, according to the present Admiralty programme, should be completed in 1903-1904. The weight of the ship at the time of launching, including cradle and 330 tons of water ballast, was 5,338 tons, and her mean draught 14 feet 10 inches. It was originally intended she should go to Devonport for completion, but it is now considered that she will, like the "Essex" and the new cruiser ordered a day or two ago, be finished at Pembroke Dock.

The Shipbuilding Programme.—The arrangements for the construction of the vessels provided for in the Navy Estimates for 1901-1902 are now complete, and all the ships are already in hand or will be commenced shortly. Contracts have also been entered into for several of the vessels provided for in the Navy Estimates of the current year. In the first-named programme there were three battle-ships, six armoured cruisers, two third-class cruisers, two sloops, ten destroyers, and five torpedo-boats. The three battle-ships are the "King Edward VII.," of which the keel plate was laid down by His Majesty at Devonport Dockyard, the "Dominion," which is to be built by Messrs. Vickers, Sons & Maxim, Ltd., at Barrow, and the "Commodore," to be built by the Fairfield Company at Glasgow. The armoured cruisers are to be built as follows, and the arrangements for furnishing them with boilers is specially interesting:—The "Devonshire" at Chatham Dockyard, and the "Carnarvon" at Messrs. Beardmore's Yard at Govan will have four-fifths of their boilers of the Niclausse type and one-fifth of the cylindrical type; the "Hampshire," building at Elswick, and the "Autrim," building by Messrs. John Brown & Co. at Clydebank, will have four-fifths Yarrow type and one-fifth cylindrical type; the "Roxburgh," building at the yard of the London and Glasgow Company, will have four-fifths Dürr type and one-fifth cylindrical type; and the "Argyll," building at the yard of the Greenock Foundry Company, will have four-fifths Babcock and Wilcox type and one-fifth cylindrical type. The third-class cruisers are to be built, the "Amethyst" by Messrs. Armstrong at Elswick, and the "Topaze" by Messrs. Laird Bros. at Birkenhead. The two sloops

"Cadmus" and "Clio" will be built in Sheerness yard. The allocation of the torpedo-boat destroyers is as follows:—The "Derwent" and "Eden" to Messrs. Hawthorn, Leslie & Co., at Newcastle; the "Exe," "Erne," and "Ettrick" to Messrs. Palmer at Jarrow; the "Ribble," "Usk," and "Teviot" to Messrs. Yarrow on the Thames; the "Itchen" and "Foyle" to Messrs. Laird Bros. at Birkenhead. The five torpedo-boats are being constructed by Messrs. Thornycroft & Co. at Chiswick.

The programme of 1902-1903 comprises two battle-ships, two armoured cruisers, two third-class cruisers, four "scouts," nine destroyers, and four torpedo-boats. The battle-ships are to be named the "New Zealand" and the "Hindostan," the former being built at Portsmouth, and the latter at the yard of Messrs. John Brown & Co. at Clydebank. Two similar vessels having been named "Dominion" and "Commonwealth" in honour of Canada and Australia respectively, it was only natural that New Zealand and India should be similarly honoured; the first name is new to the Navy List, although there had previously been a "Zealand," a capture from the Dutch. "Hindostan" is not a new name, there having been at least two vessels bearing this designation, one of which is now part of the training establishment for naval cadets, the "Britannia" at Dartmouth. The cruisers and "scouts" are not yet arranged for, and the report that the two armoured vessels will be called the "Natal" and the "Newfoundland" is at least premature. The nine torpedo-boat destroyers are to be built: the "Cherwell" and "Dee" by Messrs. Palmer at Jarrow, the "Kennet" and "Jed" by Messrs. Thornycroft at Chiswick, the "Welland" by Messrs. Yarrow & Co., the "Waveney" by Messrs. Hawthorn, Leslie & Co., the "Arun" and "Blackwater" by Messrs. Laird at Birkenhead, and the "Velox" by the Parsons Turbine Company. The nomenclature in the case of the destroyers follows that of the previous programme all the vessels being named after rivers. The four torpedo-boats are to be built by Messrs. J. S. White & Sons of Cowes.—*Times*.

FRANCE.—The following are the principal promotions and appointments which have been made: Capitaines de Vaisseau—L. Barnaud to Rear-Admiral; M. J. Aubert to "Tempête" and Command of Naval Division at Tunis; J. M. Nény to "Saint Louis"; E. M. Amelot to "Tage"; R. C. Lapotaire to "Desaix"; P. A. Campion to "Jauréguiberry." Capitaines de Frégate—C. P. Rihouet to Capitaine de Vaisseau; M. L. Escande to "Condor"; V. M. Fontaine to "Épervier"; F. O. Le Cannelier to "Troude"; P. R. Fauque de Jonquières to "Calédonien."—*Journal Officiel de la République Française*.

Admiral Pottier, Commander-in-Chief of the Mediterranean Squadron, has been informed by the Minister of Marine that the ships of the squadron are to be placed on the footing of *effectif réduit* except the destroyers of 500 tons.

The number of men attributed to each ship is:—

		Men.
Battle-ships	{ Saint Louis	460
	{ Charlemagne	460
	{ Gaulois	460
	{ Iéna	160
	{ Bouvet	140
	{ Jauréguiberry	400
Armoured Cruisers	{ Pothuau	310
	{ Latouche-Tréville	270
	{ Amiral Charner	270
Second-class Cruisers	{ Du Chayla	270
	{ Cassard	270
Third-class Cruisers	{ Galilée	210
	{ Linois	195
Torpedo-Aviso	{ Dunois	120

The *Temps* observes that the budget of 1902 provides for the maintenance of the ships of the squadron at their full complements.

It is reported from Toulon that the question of placing in the Category of Reserve several of the ships of the Reserve Squadron is being considered, which would then comprise one division only of three battle-ships. At present the Reserve Squadron consists of the battle-ships "Brennus," "Masséna," "Carnot," "Hoche," and "Charles Martel," the armoured cruiser "Chanzy," and the destroyer "La Hire." Evidently economy is the order of the day.

Criticism of the Ministry of Marine.—The *Temps* draws attention to the delays in the official work at the Ministry of Marine, which seem to show a want of organisation and method in the office. During the month of July no less than forty-five decrees and decisions affecting promotions, retirements, sick leave, appointments, etc., were all considerably in arrear, and had to be ante-dated. In the first ten days of August no less than twenty-five documents were delayed, one of which, affecting promotion of officers, refers back to the 1st June, and 3rd July, the promotions only appearing in the *Journal Officiel* of 5th August. The appointment to the command of the naval forces in Tunis has remained vacant for more than a month and a half, and that of commander of the "Mouette," at Constantinople, which should have appeared on 2nd August, was not published till 18th October. Many other similar cases might be mentioned.

As regards the *matériel*, the delay in ordering the commencement of the armoured cruiser "Ernest Renan" is more serious still. The money for this vessel was voted in the credits for 1902, and tenders were invited for her construction from four different firms, the contract being obtained by a firm at Saint-Nazaire. This was in July last, but up to the present no official order to commence the work has been issued, so that the company, which had engaged a number of extra workmen, has been obliged to discharge them. The mayor of Saint-Nazaire has been to Paris and had an interview with the Minister of Marine on the subject, who expressed surprise that the plans which had been sent to the *section technique* for alteration (it having been decided to give the cruiser another knot of speed) had not yet been forwarded to the company. The plans, however, are not ready, because (as the *Temps* remarks) the alteration practically means the drawing of a completely new set, and the alterations in the vessel will be so great that she will cease to belong to the class of five vessels which were all to be of the same type, becoming only another specimen vessel, of which the Navy already has more than enough.

The Minister of Marine, in reply to an interpellation in the Chamber of Deputies, has justified his administration of his office. He stated that, on taking over his appointment, he found that the expenditure on the fleet had already exceeded the estimates by 20,000,000 francs. He might have asked for a supplementary credit, or he might not have paid the bills, but he preferred to suspend the construction of certain ships until Parliament had voted the money. The vessels he referred to have been named in advance the "Justice," "Liberté," and "Vérité." He considered that large battle-ships should be given up, as had been done by other foreign nations without any loss of naval strength, but he would faithfully carry out the programme voted by Parliament, and would give orders for the construction of all the battle-ships therein specified, but only when there were the necessary funds. With regard to vessels already voted by the Chamber, he has not delayed their construction in any way. It is true that the type of Boiler to be placed in the "République" has not yet been decided upon, owing to the difficulty of making a choice from among the different types submitted; but the "République" will not in any case be finished until 1905, and the question of her boilers will be settled long before then. He has not advocated any change in the calibre of the

guns ; and has always opposed any alterations in the plans or armament of a ship under construction.

Submarines.—The Coast-defence Division of the Squadron of the North, under Rear-Admiral Péphau, arrived at Cherbourg on 16th October, with three torpedo-boat destroyers, after the conclusion of the fourth and last series of operations in conjunction with the submersibles. During the first day of these final operations the division, consisting of the "Bouvines," "Jemmapes," and "Valmy," with the torpedo-boat destroyers "Cassini," "Fauconneau," and "Durandal," carried out some evolutions off Barfleur, and in the evening anchored off Saint Waast la Hogue without perceiving the submersibles. The next day the ships of the division moving in line at full speed and flanked by the torpedo-boat destroyers, commenced to force an entry into the port by means of a marked passage. Three submersibles were sighted, but they were at too great a distance to interfere in any way with the passage of the vessels ; a rough sea also put the submersibles at a disadvantage. It was evident, however, that in any case the speed of the war-ships made a successful attack by the submersibles improbable under the conditions laid down.

A submarine, to be called "Goubet No. 3," is to be commenced at Toulon. "Goubet No. 2" did not give satisfaction, her speed being only 4 knots, and was sold out of the Service. It appears to be considered, however, that there is something in the design which is worth improving upon, and "Goubet No. 3" is to have an increased speed of 9 knots. If she should prove a success it is intended to construct a considerable number of these small submarines.

The Minister of Marine has given orders to suspend the construction at Toulon of the thirteen submarines ordered by his predecessor, and stated his reasons for doing so are not that he does not believe in submarines, but that these thirteen new vessels being of a novel type he has thought it wise to build only two or three at first, so that when experience has proved their value, any necessary modifications may be introduced into the remainder.

Official Report on the Recent Exercises.—Capitaine de frégate Heilmann, who commands the station of submarines at Cherbourg, has addressed a report to the Minister of Marine on the recent tactical exercises with these vessels. He explains that the battle-ships in the roads of Saint Waast la Hogue represented an enemy to be blockaded by submarines ; to gain their positions the submarines had to leave Cherbourg without being observed ; the enemy's torpedo-boats endeavouring to note their departure and give notice to the Admiral of their approach, in which case the squadron would put to sea to avoid them.

The submersibles "Narval," "Espadon," "Triton," "Sirène," and "Silure" alone took part in these operations on account of their greater radius of action, and they had to effect a dive of 12 hours' duration, from 6 a.m. to 6 p.m., and endeavour to gain their positions without being observed. They were provided with ballasted floats carrying small flags, numbered 1, 2, 3, 4, and 5, to show their presence after making an attack. These floats were introduced into the torpedo discharging apparatus in lieu of the ordinary collapsible head torpedo, and after being ejected, on coming to the surface they took a vertical position, showing by the numbered flag which submarine had fired and marking her position, thus making it possible to judge of the success of the attack.

The entrance to be guarded was about 2 miles wide and the tidal current was strong, making it difficult for the submarines to preserve the right position. On account of bad weather it was only on the third day that they were able to make a move ; it was fine and clear, but a strong breeze caused the sea to get up, making it necessary for more of the periscopes to be shown than would be the case in calmer

weather; their movements were also rendered the more difficult by the ignorance of the officers as to the position and speed of the battle-ships, whose movements were made as devious as possible so as to deceive the submarines, and the presence of two destroyers on the flanks of the battle-ships also increased the difficulties of the attack.

The result of the exercises, however, was considered satisfactory from the submarine point of view, although the ships were able to enter and leave the roads several times without hindrance. The number of successful attacks was sufficient to make it certain that an enemy attempting to enter or leave a port guarded by submarines could not do so without incurring serious loss.

The report concludes by stating that France possesses most efficient submarines, and that the crews showed great endurance, and that the submersible type, on account of their considerable radius of action, can visit an enemy's harbour and attack ships that have taken refuge.

It is announced from Cherbourg that the publication of the above report was unauthorised, and the Minister of Marine has ordered a searching enquiry to be instituted regarding this indiscretion: it is stated also that the passage in the report which seems to infer that submersibles are superior to the submarine proper, and that the latter should be done away with is incorrect.—*Le Temps* and *Le Yacht*.

New Ships.—The following is the list of ships at present under construction:—

Vessels Building.

Name.	Displacement, tons.	Where building.	Remarks; date of launch: probable date of completion, etc.
<i>Battle-ships.</i>			
Démocratie...	14,865	Brest	Ordered.
République ...	14,865	"	Launched 24 Sept.
Patrie	14,865	La Seyne	Ordered.
Liberté	14,865	St. Nazaire	"
Justice	14,865	La Seyne	"
Vérité	14,865	Bordeaux	"
Suffren	12,728	Brest	Launched; nearly complete.
Henri IV.	8,948	Cherbourg	Lchd.; practically completed.
<i>Armoured Cruisers.</i>			
Ernest Renan ...	12,550	Brest	Ordered.
Jules Michelet ...	12,550	Lorient	"
Jules Ferry	12,550	Cherbourg	Not yet lchd.; compl. 1904.
Victor Hugo	12,550	Lorient	"
Léon Gambetta ...	12,550	Brest	Lchd. 26 Oct., '01; compl. 1904.
Jeanne d'Arc	11,270	Toulon	Launched, 1899.
Gloire	10,014	Lorient	Lchd. 1900; complete 1903.
Marseillaise	10,014	Brest	Lchd. 1900; complete 1902.
Amiral Aube	10,014	St. Nazaire	Lchd. 9th May, '02; compl. '03.
Sully	10,014	La Seyne	Lchd. 4 June, '02; compl. '03.
Coudé	10,014	Lorient	Lchd. 12 Mar., '02; compl. '03.
Amiral Gueydon ...	9,516	"	(Lchd. 1899; complete '02, under trial.
Dupetit Thouars ...	9,516	Toulon	Lchd. 5 July, '01; compl. '03.
Montcalm	9,516	La Seyne	Lchd. 28 Mar., '00; compl. '02.
Desaix	7,700	St. Nazaire	Lchd. 21 Mar., '01; compl. '03.
Dupleix	7,700	Rochefort	Lchd. 28 Apr., '00; compl. '03.
Kléber	7,700	Bordeaux	Lchd. Sept. '02; complete '03.
<i>Protected Cruisers.</i>			
Jurien de la Gravière	5,500	Lorient	(Lchd. 1899, complete '02, under trial.
Châteaurenault ...	8,018	La Seyne	Not yet accepted; machinery unsatisfactory.

Vessels Building—contd.

Name.	Displacement, tons.	Where building.	Remarks; date of launch; probable date of completion, etc.
<i>Transport.</i>			
Vauchuse	1,650	Rochefort	Lchd.; compl., 1902.
<i>Torpedo-Boat Destroyers.</i>			
Pertuisane	303	Rochefort	Lchd. 5 Dec., '00; compl. '02.
Escopette	303	" " " " " "	Lchd. 29 Dec., '00; compl. '02.
Flamberge	303	" " " " " "	Lchd. 28 Oct., '01; compl. '03.
Rapière	303	" " " " " "	Lchd. 16 July, '01; compl. '02.
Sarbacane	303	" " " " " "	Laid down 1901.
Carabine	303	" " " " " "	Lchd. 21 July, 1902.
Francisque	303	" " " " " "	Ordered.
Sabre	303	" " " " " "	" " " " " "
Arquebuse	303	Havre	Complete 1903.
Arbalète	303	" " " " " "	" " " " " "
Mousquet	303	" " " " " "	" " " " " "
Sagaie	303	" " " " " "	" " " " " "
Epieu	303	" " " " " "	" " " " " "
Harpon	303	" " " " " "	" " " " " "
Fronde	303	" " " " " "	" " " " " "
Javeline	303	" " " " " "	" " " " " "
Bombarde	303	" " " " " "	" " " " " "
Catapulte	303	" " " " " "	" " " " " "
Dard	303	(?) Rouen	Ordered.
Baliste	303	(?) " " " " " "	" " " " " "
Mousqueton	303	Châlons	" " " " " "
Arc	303	" " " " " "	" " " " " "
Pistolet	303	Nantes	" " " " " "
Bélier	303	" " " " " "	" " " " " "
M ₃₂	(?)	Rochefort	" " " " " "
M ₃₃	(?)	" " " " " "	" " " " " "

With twenty-five torpedo-boats and twenty-four submarines in various stages of completion.

Orders have been given to suspend the construction of the five battle-ships of the "Liberté" class, namely, the "Liberté," "Patrie," "Vérité," "Démocratie," and "Justice." The reasons for this order are not clear.

RUSSIA.—The following are the principal appointments and promotions which have been made: Vice-Admiral—Vertchovskoi to be a Member of the Dockyard Committee. Captains—Kolands to the 31st Seamen's Division and the battle-ship "Sinop"; Boisman from the Port Arthur Torpedo Flotilla to the battle-ship "Peresviet"; Vsevolojiski to the Imperial yacht "Alexandria"; Uspenski from the battle-ship "Slava" to the battle-ship "Poltava"; Bartashevich, of the Imperial yacht "Alexandria"; Virenius, of the Educational Department of the General Staff; Bal I., of the battle-ship "Sinop"; Koroliev, of the battle-ship "Peresviet," to be Rear-Admirals.

New Ships.—The new first-class battle-ship "Kniaz Potemkin Tavritchesky" was commissioned in July last for service with the Black Sea Fleet. She was built at the Admiralty Yard, Nicolaieff, being laid down 27th December, 1897, and launched 9th October, 1900, she has thus been rather more than four years and a half under construction. Her dimensions are as follows:—Length, 378 feet 6 inches; beam, 73 feet; displacement, 12,600 tons, with a draught of 27 feet. Protection is afforded by a partial water-line

belt, 250 feet long, tapering from 9 inches at the upper edge to 5 inches at the lower; it has a width of 7 feet 6 inches, of which 4 feet 6 inches are below the normal water-line. Above the water-line belt is another, 156 feet long, reaching to the main deck and 6 inches thick; above this again is a casemate battery, 168 feet long, the armour being 5-inch. The bulkheads terminating these armour belts are 7-inch, 6-inch, and 5-inch, respectively. The armoured deck is curved throughout, with a thickness at the extremities before and abaft the water-line belt of 3 inches on the slopes. The turrets for the heavy guns are 12 inches thick, and their bases, which are carried 5 inches below the protective deck, are 10 inches; the conning towers are 10-inch, with 5-inch connecting tubes. All the armour is made at the Ishorski Works, in Russia, and hardened after Krupp's latest process. The armament consists of four 12-inch Canet 40-calibre guns; sixteen 6-inch Canet 45-calibre Q.F. guns; fourteen 2.9-inch Canet guns, with six 1-pounder Hotchkiss and six machine guns, and five submerged torpedo-tubes, one in the stem and two on each broadside. The engines develop 10,600 I.H.P., giving a speed of 18 knots; steam being generated by 24 Belleville boilers in three groups. The normal coal supply is 670 tons, with 600 tons of oil, while the double bottom is fitted to take 200 tons of extra coal. Her radius of action is 3,400 miles at a speed of 9 knots. The foremost group of boilers are fitted to burn oil, and the two after ones coal.

Two cruisers, to be called the "Izumrad" and the "Jemchug," have been laid down at the Neva Yard. Their dimensions are to be:—Length, 347 feet 10 inches; extreme beam, 40 feet; draught, 16 feet 3 inches; displacement, 3,100 tons; I.H.P., 17,000; steam will be generated by sixteen water-tube boilers of the Yarrow pattern, and the estimated speed is 24 knots. Two other new cruisers are also to be laid down at the Neva Works, each of 6,000 tons. An order for thirty torpedo-boats is also expected, the plans for which are being worked out. These, which will be of an improved "Bulnyi" type, will have a displacement of 420 tons, the largest yet built in Russia. This order will, of course, be spread over some years.

At the New Government Yard at St. Petersburg the construction of a new twin-screw torpedo transport has been taken in hand. The dimensions are to be:—Length between perpendiculars, 204 feet; beam without sheathing, 34 feet; extreme draught (with 95 tons coal and 425 of torpedoes), 15 feet; displacement, 1,360 tons, with full freight. She will have two engines, giving a speed of 12 knots, and two steel masts with yards. Her armament will be four 47-mm. guns on the upper deck, and she will have water-tight bulkheads, three to the upper deck, ten to the main deck, and four to the lower deck. A double bottom will extend 117 feet along the amidships portion, nine of the partitions being water-tight. The main deck will be of steel of $\frac{1}{4}$ inch thickness, and the space between the two 7 feet. Her metacentric radius to be also 7 feet. She is designed on the lines of the "Bug" and the "Dunai," but with improvements, and will have water-tube boilers.

The new first-class battle-ship "Oslibla" has yet to have her water-tight bulkheads tested. The trial of the electric turbine of the water-ejecting system, calculated for 750 tons an hour, showed that the bearings of the motor must be carefully dealt with to avoid over-heating. The quick-firing armament and mountings for the 11-inch guns, turned out by the Obukhov works, will shortly be ready.

On the 25th September, the Tsar performed the ceremony of the *Zakladka* at the Baltic Works, St. Petersburg, on the new third-class cruiser "Almaz," a ceremonial laying of a silver plate or tablet after a considerable portion of the ship's hull has been covered with the steel plates. The dimensions of the "Almaz" are:—Length, 363 feet, and between perpendiculars 325 feet; beam, 43 $\frac{1}{2}$ feet; draught, forward 14 $\frac{1}{2}$, and aft

17½ feet; displacement, 2,285 tons; engines, 7,500-H.P., supplied with steam by 16 Belleville boilers; coal capacity, 560 tons; speed, 19 knots. She will carry 2.95-inch and 1.85-inch guns. She was laid down on the 6th May this year, and will probably be launched in the spring of next year.

Steam Trials.—The following results have been obtained from the under-mentioned ships on their return from foreign service:—

Second-class cruiser "Kreiser" developed a mean speed of 11.87 knots at 59 lbs. pressure, and with 83½ revolutions, the engine showing an average of 1,322-H.P. The battle-ship "Sissoi Velikie" on two trips gave a speed of 15.6 knots: the revolutions averaged 77 with a working pressure of 195 lbs. The battle-ship "Navarin," two trips, a mean speed of 15.8 knots under 91 revolutions and 125 lbs. pressure. The first-class cruiser "Dmitri Donskoi," with 60 lbs. pressure in her four double boilers and an average of 68½ revolutions, developed a mean speed of 14.5 knots. The first-class cruiser "Admiral Kornilov" showed a mean speed equivalent to 17½ knots under 120 lbs. pressure, and an average of 92½ revolutions. The H.P. developed by the engines of the cruiser "Herzog Edinburgski," when the vessel attained an average speed of 11½ knots, amounted to 3,000.

The new first-class cruiser "Askold" has also concluded her trials. She made twelve runs under a various number of revolutions of all three engines, the pressure being 16 kilos to the square inch. The results obtained were:—

Revolutions.	Knots.
55	10.87
70	13.70
85	16.35
100	18.85
107	19.50
115	20.11

Her draught during trial was: 22 feet 2 inches forward, 21 feet 1 inch aft, or an average of 1 foot more than as she was taken over. The speed of 23 knots she made at that time was with 124 revolutions in deep water (60 fathoms), and 130 at a depth of 12 fathoms.

The new torpedo-boat destroyer "Boiki," of the "Cobra" type, built by the Neva Works as an improvement on the "Sokol," has completed her trials successfully. She made four runs at forced draught, attaining a mean speed of 26 knots, viz.:—

	Knots.
First	26.04
Second	25.83
Third	26.27
Fourth	25.88
Average	26.00

Her dimensions are as follows:—Length, 210 feet; beam, 21 feet; draught, 6 feet 2 inches, and 5 feet 8 inches, equal to 350 tons displacement; pressure of steam, 200 to 240 lbs. per square inch; engines, 250 revolutions at forced draught. The engines worked very evenly and without heating of the bearings, which were greased with a mixture of 30 per cent. of olive and 70 of mineral oil. The wind was S.W. 3. Four hours' continuous trial at nine-tenths full power gave a mean speed of 23.3 knots. The trial was on the whole very satisfactory, and the type is looked on as an improvement and is to be multiplied.

The new torpedo-boat destroyer "Braoyi," of the same type as the "Boiki," has also completed her trials. Her draught was : 6 feet 10 inches forward, and 6 feet 34 inches aft, without the 8-inch keel. Her four runs on the measured mile gave :—

	Revolutions.				Knots.	
First	355	...	25.76
Second	365	...	26.33
Third	360	...	25.90
Fourth	360	...	26.10
Average	26.02

The engines worked at 240 lbs. pressure in the boilers without heating, greased with mineral oil alone. The speed attained on a four hours' continuous trial at nine-tenths full draught and an average of 325 revolutions proved to be 22.61. Another destroyer of the same type, the "Buinyi," with a draught of 6 feet 11 inches forward and of 6 feet 3 inches aft, gave for four runs on the mile :—

	Revolutions.				Knots.	
First	365	...	25.95
Second	370	...	26.52
Third	370	...	26.67
Fourth...	360	...	25.71
Average	26.21

The mean speed at nine-tenths full power was 21.85 knots. The engines worked well, being greased with 13 per cent. of olive oil.

It is rumoured that all the torpedo-boats of the Baltic Fleet which have water-tube boilers fitted for patent fuel are to be altered for coal, as experience shows that a boat using the former cannot make more than 19 knots, whereas with coal the same can easily do 21. Some indeed have already been so altered.

New Condenser.—On board the torpedo-avis "Capitan Sacken," of the Black Sea Fleet, a new condenser of the Bressonov system has been tried. Careful and constant account was taken during a 36 hours' test of the steam expended and the quantity of water condensed, and the average co-efficient of production obtained was equal to 2.29, *i.e.*, the amount of water condensed to every unit of steam expended was expressed by that figure. The result is far in advance of any of the existing systems, the co-efficient of which does not exceed 1.79. The amount of water circulating needed for the cooling of second steam resulted in the figure of 1.93 for each unit of fresh water, which may be considered a near approach to perfection.

General.—The Russians estimate that since the outbreak of the war with China their naval strength in those waters has increased fully 50 per cent., and is continuing to do so. Old and worn-out ships have been replaced by those of the most modern type, and the so doing has actually diminished the cost of the maintenance of the squadron. The only ships now left of the old batch are the "Rurik" and "Rossia," both of the most modern type. They congratulate themselves on the rapidity with which the change was effected. The "Variag" was the first new arrival, and the work will continue with the arrival of the "Peresviet," which is *en route*. Of smaller vessels five large destroyers have been sent by sea in the past year, while twelve more which were sent to Port Arthur in sections are being rapidly put together. The torpedo-depôt ship "Amur" is also a marked gain. A blot they notice is that the smaller vessels are still attached to the Vladivostok Division, and the formation of a new Kwan-tung Division is advocated. Large extensions of plant for docking and

building are in progress. Good work was done with the older means, however, as the battle-ship "Sevastopol" was thoroughly overhauled, almost re-modelled there, for which the staff received the thanks of the governor.

In commenting recently on the work of the Surveying Expedition to the Frozen Ocean, the Tsar drew attention to the open passage discovered by it to the River Pechora, which shortens the distance to the mouth of that river by 70 miles; also the completion of the survey of the Yugorski Shar, and good work done in Matochki Shar and the Kara Sea. He was much interested in the photographs taken of icebergs encountered by the vessel carrying the expedition, the *Pakhtus* in the Bear's Gulf to the north of the Matochki Shar. Five years have also been spent in surveying Lake Baikal, and ten beacons established, while the south and south-west portions of the Sea of Azov have been freshly surveyed, as also the Gagrin Bight on the Caucasus Coast of the Black Sea.

The Admiralty are awaking to the necessity for auxiliary ships of various kinds, and more particularly torpedo-depôt ships, or "transports," as they call them. The laying down of a new vessel of this class has been noticed above. Their chief merit is that they will prevent the hampering of the line-of-battle ships with much impedimenta. The "Amur" and "Yenisei" are of this class, and are meant especially for keeping out-lying ports supplied with fixed torpedoes, as well as ordinary ammunition. Ordinary fighting-ships should not, they consider, use the torpedo at all, but only those specially designed for the purpose. They advocate also solidly constructed torpedo-ships, using only torpedoes, for fighting purposes, in addition to the light craft and the depôt-ship.

The question is being debated in Russia whether engineer-mechanics are really needed for the Navy. In Germany practical artificers are employed, drawn from intermediate technical schools, though under the supervision of the ships' engineers. The engineers sent out by the school are well qualified to begin with, but tend to get out of touch with the advance of theoretical knowledge. The pay, it appears, is high as compared with that on shore, and by qualifying themselves to the exclusion of other knowledge in the service branch of their calling, men get appointed to large ships who are in reality barely qualified for small ones. It is proposed that a higher qualification should be secured by increasing the probation of eighteen months, now exacted on board ship, at the works and in shore employ respectively.

The latest aspect under which the far-famed ice-breaker "Yermak" and her sister ships are contemplated is their possible utility in time of war. Russia being the chief Power that possesses ice-bound ports, the question is largely how far others, by acquiring similar vessels, would be in a better position to attack such ports, but also to some extent how far the ice, if not dispersed, would interfere with the defence of them by mines. It is considered that the recent manœuvres show that a landing is possible as against an ice-bound port by means of such vessels. It is said that the explosion of a mine under the ice with a charge of 180 lbs. of pyroxyline 8 feet below the surface will clear ice a yard thick to a distance of 4 fathoms. It is easy to lay mines from the ice, even more so than from a launch. Having got your clearing you lay mines in the ordinary way in the course of the enemy's ice-breaker and the ships which follow, and the mere fear that mines may be there will act to a large extent as a deterrent as under ordinary circumstances. In fact, the conclusion comes to is that ice is neither an advantage nor a hindrance either to an assailant or defender; but granted ice-breakers, the same conditions apply as in the ordinary attack or defence of a fortified port.

St. George's Day was marked by the presentation of colours to the 37th Seamen's Division, which has been reformed after a temporary disbanding. The colour, that of St. George, was presented to the old division in recognition of its services during the siege of Sebastopol. On the conclusion of the Crimean war, when by the Treaty of

Paris a limit was put on the Russian naval strength in the Black Sea, the division was first transferred to Baku and then broken up, and the flag placed in the cathedral at Nicolaieff. The flag is of white silk with blue stripes cross-wise and a shield with a figure of St. George slaying the dragon, with the words round the edge "For the defence of Sebastopol from September 13th, 1854, to August 27th, 1855." The staff of white wood ends in a gold head, with a white St. George cross in enamel. The first-class cruiser "Kagul," now in process of construction at the Nicolaieff Yard, is to be manned by the resuscitated division, the nucleus of which was furnished by the 36th, the remainder being recruits of the last levy. It comprises 754 men, a commander, 5 company commanders, an adjutant, and several subaltern officers.

A new regulation is shortly to come into force to give the preference, at least for such posts as commanders and officers second-in-command of ships, to such officers as have obtained a torpedo or gunnery certificate, and to admit such as have not one of these only where none so qualified are forthcoming in the former case, and in the latter to those who have the navigating certificate of the Nicolaiev Naval Academy. The regulation is welcomed by a large majority of officers.—*Kronstädtski Viestnik*.

UNITED STATES.—*Bureau of Steam Engineering*.—In his annual report, Rear-Admiral Melville, Chief of the Bureau of Steam Engineering, urges the imperative necessity for strengthening the Navy along engineering lines. It is the requirements of the future rather than the demands of the present which should be provided for. He says it will not be long before the younger officers who have been trained in professional engineering work lose interest, aptitude, confidence, and even efficiency in engineering duties, if they are allowed to specialise in other directions. He says:—"From this and other causes engineering efficiency in the Navy is rapidly decreasing. With such a state of affairs a trained engineering force for the future needs can hardly be regarded as satisfactory. It should not, therefore, excite surprise when I unqualifiedly assert that there has been retrogression rather than advance along engineering lines during the past two years." He says individual officers have striven earnestly to perfect themselves in the duties of the engine-room, but calls attention to the fact that there has been no systematic plan enforced for universal training. "As a result of this inadequate supervision in the engine-rooms there has been a perceptible decrease in the efficiency of the machinery and a progressive increase in the cost of repairs."

The following recommendations are made:—

1. That the policy lately inaugurated of detailing junior officers of the line exclusively to engineering duties be greatly extended.
2. That a post-graduate course of instruction in marine engineering and design be established at the Naval Academy for junior officers of the line.
3. That at least two war-vessels be used in part for the general training of firemen.
4. That several torpedo-boats be kept in commission for the training and instruction of machinists and water tenders of torpedo-boat service.
5. That all machinists of the second class be sent to a Navy Yard for practical work on ships under repair.
6. That warrant machinists be placed upon the same footing as regards pay and rank and emoluments as given other warrant officers.
7. That a special rate of pay be allowed those petty officers in the engineer department who qualify as water tenders of torpedo-boats.

—*Army and Navy Journal*

Estimates for Naval Ordnance.—Among the most interesting statements which have been submitted to the House Committee on naval affairs during the hearing on the Naval Appropriation Bill was one by Rear-Admiral Charles O'Neil, U.S.N., Chief of the Bureau of Ordnance, on proposed changes in plans of naval construction. Admiral O'Neil said that he recommended two different types of vessels, the battleship and the armoured cruiser, and that his general conclusions favoured larger ships and heavier armour. He favoured no increase in the size of the guns, the 12-inch should be the maximum. It is intended to replace the 6-inch pieces with guns of 7-inch calibre. He and his associates had concluded not to recommend the superimposed turret for the new ships, and had also decided that the decks of vessels recommended should not be sheathed. The Admiral gave it as his opinion that owing to changed conditions it was now possible to build war-ships at the Navy Yards as economically as they can be built elsewhere, and no navy yard could do worse, as far as the time limit of construction is concerned, than half of the private ship-builders. On this point he said :—“Formerly the method of keeping accounts were not as good as it is now, and the political situation was very bad. In other words, everybody was turned out when there was an election. They do not do that now. The labour board system has improved that condition. Men register, and the only advantage a man can possibly get under that in the way of favour is that he may be kept at work longer ; he may not be selected for discharge. They can exercise a little favouritism in keeping men in, but as far as taking them on is concerned the situation is very much improved.” Admiral O'Neil was asked as to which was most advisable to omit, the appropriations for battleships or the appropriations for the cruisers in case it was found necessary to cut down the naval estimates. His reply was : “Neither. Leave off something smaller. When we get through with our programme we will only have 17 battleships and 8 armoured cruisers. England has 52 battleships, and I don't know how many cruisers. The cost of all the ships amounts to about 16,000,000 dollars a year, extending over 17 years. The New York Central Railway, a private corporation, is going to expend over 50,000,000 dollars for a depôt.

In addition to this statement concerning charges in the plans of construction, Admiral O'Neil placed before the Committee a memorandum explanatory of estimates for the Bureau of Ordnance. One of these estimates, amounting to a total of 800,000 dollars, is for the procuring, producing, preserving, and handling ordnance material ; for the armament of ships ; for fuel, material, and labour to be used in the general work of the Ordnance Department ; for watchmen at magazines, powder factories, and powder depôts ; for furniture in ordnance buildings at navy yards and stations ; for maintenance of proving ground and powder factory and the target practice. The information presented by Admiral O'Neil shows that the total cost of target practice for all vessels of the Navy per annum is 895,000 dollars, or, allowing for a certain number of vessels out of commission, probably 750,000 dollars per annum. The cost of target practice for one battleship like the “Alabama” for one year is 30,895 dollars, three-fourths of such practice being conducted with the cheapest kind of ammunition—that is, with brown powder. The cost of maintaining the Ordnance Department of the Navy is steadily increasing, having risen from 180,000 dollars in 1892 to 500,000 dollars in 1900 and to an estimated total of 800,000 dollars for the year to come. The estimate for smokeless powder is 500,000, and at this rate it will take several years to supply all the older vessels of the Navy with smokeless powder, and, moreover, there should be a good supply on hand for reserve guns for auxiliary cruisers. A large ship carries from 100,000 to 150,000 lbs. of smokeless powder, costing from 80,000 dollars to 120,000 dollars per ship, according to the size. The five battleships, six armoured

cruisers, and three protected cruisers now building will require 3,120,358 lbs. of smokeless powder, costing 2,496,286 dollars.

Admiral O'Neil's estimates include 175,000 dollars to provide twelve 6-inch 40 calibre rapid-firing guns for the U.S.S. "Newark," and 200,000 dollars for new and improved batteries for the U.S.S. "New Orleans" and the U.S.S. "Albany." Of these ships the memorandum says:—"These two vessels, built in England for Brazil, were purchased at the outbreak of the late Spanish-American war. The guns differ in type from those used in the Navy, requiring special ammunition, and it is, therefore, a source of serious inconvenience to keep them supplied. It is thought that they should carry standard United States Navy guns." Another appropriation recommended is one of 10,000 dollars for a travelling crane for the proposed storehouse for guns in the navy yard at Portsmouth, N.H. The Bureau of Ordnance has requested the Bureau of Yards and Docks to recommend an appropriation of 50,000 dollars for such a building. There are no proper storage facilities at the Portsmouth Yard for modern guns and mounts, and the same are urgently required. Whilst old cast-iron guns were left in gun parks, modern guns cannot be treated thus, but must be kept under cover and be properly cared for. Other estimates include one of 5,000 dollars for machine tools for the Ordnance Department of the Boston Navy Yard and one of 10,000 dollars for a travelling crane and fixtures for the proposed storehouse for guns at the Boston Navy Yard. The Bureau of Ordnance has requested the Bureau of Yards and Docks to include in estimates an item of 50,000 dollars for a storehouse for guns at the Boston Navy Yard. There, as at Portsmouth, there is an utter lack of facilities for the storage of modern guns, and the same are urgently needed. It is also recommended that 10,000 dollars be appropriated for a travelling crane and fixtures for a proposed storehouse for guns at the Navy Yard at Bremerton on Puget Sound, and the Bureau of Ordnance has requested the Bureau of Yards and Docks to include in its estimates an item of 40,000 dollars for the erection of such a building.

In recommending an appropriation of 250,000 dollars for reserve guns for auxiliary cruisers, Admiral O'Neil points out that the number of such reserve guns is very small, notwithstanding the fact that quite a number have been made, the shortage being due to the fact that many have been absorbed for training-ships and for other purchased vessels. There are now under contract seventy-two guns, or enough to arm eight or ten vessels only. It is evident that such a number is totally inadequate, and appropriations should be made for a number of years for reserve guns: that the rifling of guns will, in course of time, wear out, rendering it necessary to insert a lining tube in them, and that accidents will from time to time occur to guns in service which will necessitate their removal from ships for purposes of repair. In either case vessels must be laid up while such repairs are being made, or must go without a part of their armament. It is, therefore, recommended that a few spare guns be procured to be held in reserve. Moreover, one or two guns of each calibre are always required at the proving ground for making tests of armour, of powder, and projectiles.

Admiral O'Neil states that the Bureau of Ordnance has been in correspondence with the War Department as to the use of Governor's Island in New York Harbour for a site for a naval magazine, but as it is only one mile distant from populous neighbourhoods it has been deemed an unsuitable site. He, therefore, recommends that a site of sufficient area, remote from populous neighbourhoods be procured by purchase, and that suitable buildings be erected thereon, the total cost not to exceed 500,000 dollars, of which 250,000 dollars should now be made available. He recommends the appropriation of 5,200 dollars for quarters for gunners at Rose Island in Newport Harbour, the naval magazine at Newport, where large quantities of gun-cotton are stored and also powder

from various sources. Among the items recommended in the memorandum is one of 49,500 dollars for the Iona Island naval magazine near New York. The Bureau of Ordnance has been much troubled by blasting operations on Round Island, which lies south and very close to Iona Island. The Navy Department has received letters from parties in New York, stating that 25,000 dollars to 30,000 dollars would be a proper price to pay for Round Island; that its original cost to the owner was about 19,000 dollars, and that it is doubtful if it has yielded anything like the profit claimed by him. In view of the statements, it is the opinion of the Bureau of Ordnance that it would be well to empower the Secretary of the Navy to purchase the island if it can be had at a price not to exceed 50,000 dollars, and failing in that, to institute condemnation proceedings against the property. The owner wants 325,000 dollars for his property.—*Army and Navy Journal*.

MILITARY NOTES.

PRINCIPAL APPOINTMENTS AND PROMOTIONS FOR OCTOBER, 1902.

Lieut.-General Sir C. M. Clarke, Bt., G.C.B., Q.M.G. to the Forces, to be General. Lieut.-General Sir C. J. East, K.C.B., to be General. Major-General Sir I. S. M. Hamilton, K.C.B., D.S.O., from the Staff in South Africa, to be Military Secretary. Major-General W. Cooper to be Colonel of Alexandra, Princess of Wales's Own (Yorkshire Regiment). Major-General A. H. Paget, C.V.O., to be Major-General on the Staff to command a Division, 1st Army Corps. Major-General (local Lieut.-General) Sir B. Blood, K.C.B., R.E., a Lieut.-General on the Staff in India, is promoted to the rank of Lieut.-General as carried by his appointment. Colonel (temporary Major-General) D. D. T. O'Callaghan to be a Major-General on the Staff to command the Royal Artillery at Malta. Colonel (temporary Major-General) Sir G. H. Marshall, K.C.B., to be a Major-General on the Staff to command the Royal Artillery, 1st Army Corps. Colonel (temporary Major-General) G. Henry, R.E., Q.M.G. in India, is promoted to the rank of Major-General as carried by his appointment. Colonel (temporary Major-General) W. T. Shone, C.B., D.S.O., D.G. of Military Works in India, is promoted to the rank of Major-General as carried by his appointment. Colonel (temporary Major-General) C. H. Scott, C.B., D.G. of Ordnance in India, is promoted to the rank of Major-General as carried by his appointment. Colonel (temporary Major-General) J. F. Bally to be a Major-General on the Staff to command the Royal Artillery at Gibraltar, and is promoted accordingly. Lieut.-General J. Fryer, C.B., to be Colonel of the 6th Dragoon Guards. Major-General Sir A. J. H. Elliot, K.C.B., from 6th Dragoon Guards to be Colonel of the 21st Lancers. Colonel W. E. Franklyn, C.B., from Assistant Military Secretary at Head Quarters, to be a Brigadier-General on the Staff to command the 10th Infantry Brigade, 5th Division, IIrd Army Corps, and to have the temporary rank of Brigadier-General whilst so employed. Major and Brevet Colonel J. S. Ewart, from the Queen's Own (Cameron Highlanders), to be Assistant Military Secretary at Head Quarters, with the substantive rank of Colonel in the Army. Lieut.-Colonel L. E. B. Booth from a D.A.A.G. to be Colonel to command the 16th Regimental District (Belfordshire Regiment). Colonel W. G. Knox, K.C.B., from Staff in South Africa, to be a Major-General on the Staff to command the Royal Artillery, IIIrd Army Corps, and is promoted accordingly. Veterinary-Lieut.-Colonel H. Thompson, C.B., A.V.D., to be D.G., A.V.D., and to have the substantive rank of Veterinary-Colonel in the Army. Brevet Colonel Sir J. Willecocks, K.C.M.G., D.S.O., a Brigadier-General on the Staff in India, to have the substantive rank of Colonel in the Army. Brevet Colonel C. W. Park, A.D.C., from Lieut.-Colonel the Devonshire Regiment, to be A.A.G., District and Garrison Staff, South-Eastern District, with the substantive rank of Colonel. Colonel Sir W. D. Richardson, K.C.B., from an A.A.G. to be a Colonel on the Staff and Director of Supplies, IIrd Army Corps. Colonel H. N. Bunbury from an A.A.G. to be a Colonel on the Staff and Director of Transport, IIIrd Army Corps. Brevet Colonel C. A. Hadfield from Lieut.-Colonel A.S.C., to be a Colonel on the Staff and Director of Transport, IIrd Army Corps.

MILITARY NOTES.

1477

Army Expenditure, 1902-03 (South African War).—Statement showing approximately the revised amounts now required under the various votes in view of the conclusion of peace as compared with the Provision made in the Estimates submitted to Parliament, with explanations of the differences.

Vote.	Allocation of amount provided in Estimates	Allocation now required.	Less than original estimate.	More than original estimate.	Remarks.
1. Pay, &c., of Army	£ 9,990,000	£ 14,690,000	£ ...	£ 4,700,000	This excess is made up roughly as follows:— Pay of general staff (including Field Intelligence), regular troops, &c., including gratuities of pay on demobilization £ 2,200,000 War gratuity 2,000,000 Wages of civilian subordinates 500,000 4,700,000
2. Medical Services	600,000	600,000	...	...
3. Pay, &c., of Militia	520,000	870,000	...	350,000	This excess is on account of gratuities of pay, &c., to militiamen on demobilization.
6. Transport and Remounts	10,000,000	6,850,000	3,150,000	...	This net reduction is made up as follows:— Saving on land transport £ 650,000 Saving on purchase of remounts 1,500,000 Additional receipts for sale of horses, mules, oxen, &c. 2,500,000 4,650,000 Less excess on sea transport 1,500,000 3,150,000
7. Provisions forage, &c.	12,030,000	10,780,000	1,250,000	}	The saving on these three votes arises partly from the earlier cessation of hostilities and partly from additional receipts.
8. Clothing	2,485,000	1,985,000	500,000		
9. Stores	2,980,000	2,480,000	500,000		
10. Works, &c.	645,000	995,000	...	350,000	This excess is mainly on engineer services in the field and accommodation for officers. The excess would have been larger but for additional receipts to be derived from the sale of huts, blockhouses, &c.
12. Miscellaneous	40,000	240,000	...	200,000	The deficit arises mainly on compensation for losses, bank commission, medals, &c.
13. War Office	60,000	60,000	...	...
14. Non-effective charges (Officers)	245,000	645,000	...	400,000	The excess is for gratuities, &c., on cessation of hostilities, to officers who had been re-employed from the retired or the reserve list, &c.
15. " " (Men)	55,000	55,000	...	...
Total	39,650,000	40,250,000	5,400,000	6,000,000	
				600,000	

NOTE.—It is anticipated that the net excess of £800,000 over the amount provided can be met by savings on normal services mainly arising on Votes 3, 4, and 6.

ST. JOHN BRODRICK.

War Office,
6th November, 1902.

AUSTRIA-HUNGARY.—*Danzer's Armer-Zeitung* states that during last month some interesting experiments in shooting were made at the Steinfeld range in connection with the school of gunnery for the Austrian garrison artillery. An old, but still serviceable, search-light was placed at a distance unknown to the gunners and illuminated at night. Fire was then opened on it from a battery of six 4.7 guns, and within five minutes from the first round the mirrors of the search-light were smashed to pieces. A second search-light was hit after a few rounds had been expended in getting the range. The distance was about 2,200 yards. During the daytime a captive balloon of about 10 feet in diameter was fired at. The distance was 3,300 yards, and the balloon was some hundreds of feet in the air (the height is not stated more definitely). After twenty rounds a shrapnel shell exploded close to the balloon, from which issued a long stream of fire, and the balloon fell rapidly to the earth. These experiments were followed by two batteries being opposed to each other in a manner which has already been practised in France and Russia. Each battery was connected by telephone with the marker at a dummy battery in which the figures representing the gunners were so constructed as to fall when hit. Each battery opened fire upon the dummy battery of its opponent. The casualties in the dummy battery were telephoned to the real battery when men corresponding to the fallen figures were withdrawn, and the battery which in course of time no longer had men left to serve it lost the contest.—*Times*.

CHINA.—*Results of the Census*.—According to the *Militär-Wochenblatt*, a census of the whole of the Celestial Empire has recently taken place by order of the Imperial authorities at Peking. The following are the results for the individual provinces:—

Provinces.	Area in Square Kilometres.	Population.	Population to Square Kilometre.
Pe-chi-li	300,000	20,937,000	70
Shan-tung	145,000	38,247,900	264
Shan-si	212,000	12,200,456	57
Honan	176,000	35,316,825	201
Kiang-su	100,000	13,980,235	140
Ngan-hwei	142,000	23,672,314	167
Kiang-si	180,000	26,532,125	148
Fo-kien	120,000	22,876,540	191
Che-kiang	95,000	11,580,692	122
Hu-pei	185,000	35,280,665	191
Hu-nan	216,000	22,169,673	103
Kwei-chau	174,000	7,650,282	44
Shen-si	195,000	8,450,182	43
Kan-su	325,000	10,385,376	32
Sze-chuan	566,000	68,724,890	121
Kwang-tung	259,000	31,865,251	123
Kwang-si	200,000	5,142,330	26
Yunnan	380,000	12,721,574	34
<i>Dependencies.</i>			
Manchuria	942,000	8,500,000	9
Mongolia	3,543,000	2,580,000	7
Thibet	1,200,000	6,130,020	5
Turkestan	1,426,000	1,200,000	8
Total	11,081,000	426,444,350	

The number of inhabitants to the square kilometre is about 115 in the 18 provinces, and 4 inhabitants to the square kilometre in the 4 dependencies.

FRANCE.—*The Government of French West Africa.*—The Colonial Minister has addressed a report to the President of the Republic, in which, after a short history of the various French Colonies of West Africa and of their grouping, he brings to notice that at the present time the control of all the various French possessions lies in the hands of one Governor-General, and that his supervision alone is quite inadequate. As a matter of fact, with the exception of Senegal, the Governor-General has merely the political and military supervision of the Colonies placed under his authority; he has nothing whatever to do with the interior administration of their interests, or of their agricultural and commercial development. This abstention is especially regrettable at the present time when the economic scope of the French West African possessions is becoming of great importance, shown by a commercial impetus the total amount of which exceeds 160,000,000 francs in 1901, owing to the increase in the budgetary receipts due to the completion of large works of general utility. At the present time it is of importance to give a wider authority to the Governor-General of French West Africa, an authority that will allow him to exercise the rôle of chief arbitrator, whose intervention in administrative matters can neither be set aside nor contested.

With this object the President of the Republic signed a decree, on the 1st October last, which secures, in principle, their administrative and financial autonomy to the West African Colonies, under the supervision of the Governor-General, confirmed each year by the establishment of a separate budget, which will in future be confirmed by decrees. At the same time, however, this decree strengthens the authority of the Governor-General, as regards the local services of these possessions, by a strict subordination of the *personnel*, by a more thorough centralisation of correspondence and by a less limited control of the various administrative departments. Finally the decree transfers the seat of government from Saint Louis to Dakar, in order the better to safeguard liberty of action outside and beyond local administrations, and it places the colony of Senegal under a Lieut.-Governor, similarly to Guinea, the Ivory Coast, and Dahomey. The Governor-General, it is true, must still himself look after the administration of certain districts hitherto attached to Senegal, and which will in future be called "Senegambia and the Niger Districts," but he will, at the same time, be assisted in the carrying out of this portion of his duties by a chief secretary as well as by permanent proxy, his representative at Kayes.

The general government of French West Africa will consequently consist of:—

1. The Colony of Senegal, to which the protectorate districts are no longer attached.
2. The Colony of French Guinea.
3. The Ivory Coast Colony.
4. The Colony of Dahomey.
5. The protectorate districts, now dependencies of Senegal, as well as the Upper Senegal and Mid-Niger districts, will in future be grouped as a new administrative and financial unit, under the name of "Senegambia and Niger Districts."

The colonies and districts of French West Africa enjoy their administrative and financial autonomy under the following conditions:—

1. Under the supreme authority of the Governor-General, the colonies of Senegal, French Guinea, the Ivory Coast, and Dahomey are each administered by a colonial governor, called a lieut.-governor, and assisted by a chief secretary.

2. The Governor-General directly administers the Senegambia and Niger Districts, or specially delegates his authority to the Government Chief Secretary.—*Revue de Cercle Militaire*.

ITALY.—Military Position of Italy.—According to the *Manuale di Organizzazione Militare*, by Lieut.-Colonel Corticelli, of the Italian General Staff, the Italian Army consists on mobilisation of the following effectives, viz.:—Permanent Army, 15,723 officers and 523,617 men; Mobile Militia (Landwehr), 55,080 officers and 208,734 men; Territorial Militia (Landsturm), 79,410 officers and 349,662 men; altogether, 150,213 officers and 1,082,013 men. These figures, it is true, date from ten years back, but the last edition of von Löbell's *Jahresberichte* does not give any more recent ones, owing to the fact that Italy no longer publishes information about the strength of her Army. At the same time the numbers mentioned above correspond sufficiently closely to the reality, for the Italian military budget for 1901-1906 carries a credit for the purchase of 1,200,000 rifles with 300 solenite cartridges for each arm. With the Permanent Army it is proposed to form four armies of three army corps each; 12 divisions will be formed of the Mobile and 24 of the Territorial Militia. There exist no cadres for the Militia and about two-thirds of the men who would form the Regular Army, on mobilisation, are on leave and would first have to be recalled. The military organisation due to the Minister Pelloux and adopted for the last four years has replaced the old recruiting system by introducing national recruiting with fixed depôts for the infantry and changes of garrison, and by reducing, as far as possible, the distance to the various points of assembly for men recalled to the colours in time of war. In spite of this fact, however, all these distances are far greater in Italy than in Germany or Austria-Hungary, which have both, more or less, entirely adopted the absolute "territorial system." Thus, as at the outbreak of war, the Italian Army would have to triple its effectives under very complicated organisation and recruiting conditions, and, as almost all the Italian railways belong to private companies, her Army would necessarily mobilise much more slowly than the German and Austrian Armies. The mobilisation too of the Militias would be carried out at an even slower rate, inasmuch as emigration has increased to such an extent that certain provinces are threatened with absolute depopulation and the war effectives will consequently suffer proportionately. It is calculated that the first line of the Italian Army would not be able to commence strategic deployment before the 15th day, at the earliest, after the order to mobilise had been sent out; according to this, then, it would require five more days than is generally calculated, for the same purpose, for the Armies of Germany and Austria, and it is highly probable that the Italian Army would require even more time than the fifteen days already mentioned.

Neither is the strategic position of Italy an advantageous one. The campaigns of 1797, 1799, 1800, 1859, and 1866 have shown that the Alps in no way constitute a serious obstacle to hostile armies. Italy has, besides, thoroughly recognised the fact that her frontiers have need of fortified protection, the more so that many of the old fortresses, such as Verona, are in reality directed against Italy herself. Further, since the realisation of Italian unity, a sum of 200,000,000 lire has been spent in making a chain of barrier forts along the frontiers and in fortifying Rome; and to this sum must be added a further 20,000,000 lire demanded for the period 1901-06. At the next legislative session, too, it is proposed to ask for 20,000,000 more for coast defence. The larger sums spent, these last few years, on fortress artillery conclusively proves that Italy intends to remain rather on the defensive in the event of a war. As a matter of fact, one could hardly expect her to maintain any other attitude at the outbreak of a

war between the Triple and the Dual Alliance. Mobilising and concentrating more slowly than the French, the first thing for the Italian Army to attempt would be to prevent her Western neighbour from penetrating into Upper Italy, that is to say, to engage that adversary in the secondary theatre of war, viz., the Franco-Italian frontier, and thus to weaken the French forces put into line on the principal theatre of war, viz., the Franco-German frontier. In French and Italian military circles, too, it is considered certain that France would not confine her attack on Italy to the Alpine frontier alone, but, in addition to a Southern Army operating against Upper Italy, she will especially direct her efforts against the Italian coast, and that these efforts would resolve themselves into a chief attack directed against Rome, accompanied by an attempted diversion against Sicily.—*Internationale Revue über die Gesamten Armeen und Flotten.*

JAPAN.—*Budget for 1902-1903.*—The receipts foreseen for the year 1901-1902 amount to 273,630,876 (a yen = 2s. 0½d), and are made up as follows :—

	Yen.
Ordinary Receipts	224,795,040
Extraordinary Receipts	48,834,836

The expenditure is thus divided :—

ORDINARY EXPENDITURE.	
Civil List	3,000,000
Foreign Affairs	2,282,785
Home Affairs	10,583,416
Finances	61,763,678
War	38,432,317
Navy	21,349,053
Jurisprudence	10,837,645
Public Instruction	4,845,708
Agricultural and Commerce	2,948,912
Communications	21,172,976
Total	177,216,494

EXTRAORDINARY EXPENDITURE.	
Foreign Affairs	52,724
Home Affairs	9,846,373
Finances	39,482,696
War	6,967,167
Navy	7,076,585
Jurisprudence... ..	565,640
Public Instruction	2,015,156
Agriculture and Commerce	3,824,513
Communications	22,346,142
Total	93,207,996

Making altogether an expenditure of 270,424,490 yen. Those referring to the War Department are sub-divided as follows :—

ORDINARY EXPENDITURE.	
Central Administration	238,272
Military Expenditure	36,958,180
Police	1,064,794
Colonial Troops	153,520
Contributions to the Jasukimi Funds	7,550
Total	38,432,317

EXTRAORDINARY EXPENDITURE.						Yen.
Construction of fortifications	...	...	...	...	...	2,931,772
Repairs and building	...	...	...	...	...	222,278
Cartography	...	...	...	...	...	248,922
Equipment	...	...	...	...	...	2,471,688
Manufacture of stores	...	...	...	...	...	1,644,538
Temporary constructions	...	...	...	...	...	47,574
Suppression of banditti at Formosa	...	...	...	...	...	50,000
Temporary army corps	...	...	...	...	...	246,503
Regulation of war affairs	...	...	...	...	...	10,370
Historical archives	...	...	...	...	...	50,831
Special credit	...	...	...	...	...	73,687
Total	...	...	...	...	...	7,967,167

The total expenditure of the War Department thus amounts to 46,399,484 yen for peace effective of about 145,000 men.

A certain number of special accounts have been grafted on to the general budget of receipts and expenditure : three of these refer especially to the War Department, viz. :—

The Tokio Military Arsenal.

Revenues	...	...	...	...	...	6,885,104
Expenditure	...	...	...	...	6,382,743	} 6,883,043
Reserve Funds	...	...	...	...	500,300	

The Otaka Arsenal.

Revenues	...	...	...	...	...	6,737,104
Expenditure	...	...	...	...	6,226,804	} 6,727,104
Reserve Funds	...	...	...	...	500,300	

The Senju Clothing Manufactory.

Revenues	...	...	...	...	...	2,619,886
Expenditure	...	...	...	...	2,016,661	} 2,617,361
Reserve Funds	...	...	...	...	600,700	

—*Recue Militaire.*

The War Academy.—The Japanese War Academy was founded in December, 1882, on the model of the one at Berlin. The course there lasts for 3 years ; the number of officers received annually is usually 15, of the rank of lieutenant. The number is, however, liable to fluctuate, and as many as 30 officers have sometimes been admitted at a time. The Prussian general Meckel was professor there for 4 years, viz., from 1885 to 1889. During his professorship he introduced kriegspiel and tactical problems on the map into the Japanese Army. He was succeeded, in succession, by General von Blankenbourg, and the late General Grutschreiber, who was the last professor at the War Academy at Tokio, which he left in 1899.

The Academy has had, as commandants, Baron Kodalga, the present War Minister ; General Viscount Kavakami, who was Chief of the General Staff ; General Baron Oshima, now commanding the 9th, and General Baron Tashimi, now commanding the 8th Division. Its present commandant is Lieut.-General Teraoutchi. Officers, having at least 2 years' service in the commissioned ranks and who have successfully passed a qualifying and an entrance examination, are admitted to the Academy. The qualifying examination takes place in March at the headquarters of each division ; 100 officers are allowed to present themselves for this examination. The examination for

admission takes place in June at the Academy ; 50 officers only are allowed to present themselves for it. The course commences on 1st December and lasts until the beginning of June. From August to October the officers are attached to corps of different branches of the Service and take part in the autumn manoeuvres. They also visit forts, coast defences, the fleet, and take part in rifle practice at the musketry schools. At the end of the third year they have to make out a strategic scheme as an exit examination. They then return to their original corps, decorated with a special badge, which they wear on all occasions, showing they have been through the Academy. Those best reported on are, in addition, honoured with a sword, which is presented to them by the Emperor. Special care is taken to prevent the professors from becoming a fixture at the Academy, and they are sent back to their corps for duty every few years. On their exit, officers return to their regiments for one year, and are then attached for one or two years to the General Staff ; they are then definitely appointed to the staff if favourably reported upon. Most of them are afterwards sent abroad, sometimes for many years, generally to France and Germany. Those who do not obtain a staff appointment become professors at the military, cadet, and musketry schools, or carry out the duties of orderly officers to generals.

The course at the Academy consists of :—1. Tactics. 2. Military History (the Chino-Japanese war of 1894-95 ; the Franco-German war of 1870-71 ; the Russo-Turkish war of 1877-78 ; the Bohemian war of 1866, and the campaigns of Napoleon). 3. Staff Duties (organisation of the Japanese and the principal Continental staffs ; organisation of the Japanese Army and Navy ; staff service in peace and war ; mobilisation ; communications and the administration and medical services). 4. Military geography of Japan and neighbouring countries. 5. Artillery. 6. Permanent and hasty fortifications. 7. Land and maritime siege warfare. 8. Operations of lines of communication (field railways, bridges, telegraphs, ballooning, carrier-pigeons, sea transport). 9. Hippology. 10. Hygiene. 11. Statistics. 12. Political law. 13. General history and geography. 14. Mathematics. 15. Topography. 16. Equitation.

Instruction in the living languages is not universally followed. At the present time the following languages are taught at the Academy, viz., English, German, French, Russian, and Chinese. The two first are followed by the most, viz., 50 of the students ; French and Russian have between 20 and 30 students, whilst Chinese has only 3. Most of the professors of the living languages are foreigners.—*La France Militaire*.

SWEDEN.—Re-organisation of the Army.—The reforms sanctioned by the new law on the military service and organisation of the Swedish Army began to come into operation during the autumn of last year. Although, as is known, this law will not come into full effect until 1914, it may be as well to give now a sketch of the most important innovations introduced by it. Amongst the later figures the new organisation of the staff service. In order to be appointed lieutenant on the staff every officer must fulfil the following conditions :—

1. He must have taken part for three years in all the exercises of the branch of the Service to which he belongs.
2. He must have undergone a course at the academy or at the artillery or engineer's schools.
3. He must have served a term of probationary duty in each branch of the Service other than his own.

4. He must have served as a probationer on the staff for 2½ years, and during that period must have gone through two summer manœuvres on topographical duty, have done duty with the chief section of the general staff, and with that of state defence, and finally have taken part in staff rides.
5. He must be a good rider.

Should the officer have already taken part in some of the exercises and works mentioned in para. 4, the term of this probationary service on the staff may be reduced.

The organisation of the army corps staff has also been changed. This staff consists now of a chief of the staff, a staff captain, two orderly officers (one a captain and the other a lieutenant), the principal medical officer of the army corps, engineer officers and commissariat officials. The staff of an army corps is divided into two sections: the 1st, under supervision of the chief staff officer, has to elaborate questions regarding preparations for war and the mobilisation of the army corps; the 2nd, under the orderly officers, is charged with matters regarding the *personnel*.

This year the war budget was fixed at 61,839,835 francs. This sum is thus divided: ordinary expenditure, 45,089,857 francs; extraordinary expenditure, 16,749,984 francs. The budget shows this year an increase of 13,350,000 francs over that of last year: this was necessitated by the new effectives of the cadres. Amongst the extraordinary expenditure may be mentioned:—

	Franks.
Purchase of new rifles and carbines	1,900,000
Purchase of new field guns	2,700,000
Construction of fortified works	2,600,000
Construction of barracks	5,000,000
Subsidies to shooting societies	500,000
Reserve funds	800,000

It may be remarked that the total number of rifles and carbines to be bought by the state amount, to 350,000 of the former and 50,000 of the latter. The credits voted this year allow for the purchase of about 150,000 rifles and 20,000 carbines. The carbines should be available the first in order to arm the units of the newly-organised engineer, transport, and fortress troops. About 25,000 rifles can be manufactured a year.

As regards the field artillery, a contract was effected by which the Krupp foundries engage to supply Sweden with all the *matériel*. The Swedish Government, however, reserves to itself the right to manufacture 120 caissons and 23,000 projectiles in the national works on the condition that the Krupp works receive an order for 120 guns with gun carriages and limbers. Experiments with field artillery gun carriages are still being carried out at the present time. In spite of that fact, in June, 1901, the King of Sweden decided to give a portion of the order mentioned above, which would tend to show that the definite adoption of the Krupp gun is no longer a matter for doubt.

Experiments have been made in Sweden, as amongst other Powers, as to the best colour for uniform, and as a result a neutral tint, a sort of cinnamon grey, has been finally selected. The number of horses for the State has been fixed this year at 9,396, viz.: Cavalry, 6,000; Artillery, 2,929; Engineers, 143; Transport, 324.

In conclusion, it may be of interest to give some details of the peace effective of the Swedish Army when the new law comes into full effect. The *personnel* of the Staff and administration will consist of 374 officers or clerks. The other effectives will be as follows:—

Infantry.—1,293 officers, 1,041 sergeants, 3,998 corporals, 326 cadets, 4,117 volunteers, and 16,800 recruits.

Cavalry.—270 officers, 150 sergeants, 910 corporals, 60 cadets, 2,010 volunteers, and 1,700 recruits.

Artillery.—451 officers, 390 sergeants, 1,505 corporals, 144 cadets, 1,192 volunteers, and 3,396 recruits.

Engineers.—128 officers, 108 sergeants, 252 corporals, 15 cadets, 317 volunteers, and 500 recruits.

Transport.—90 officers, 108 sergeants, 282 corporals, 12 cadets, 156 volunteers, and 156 recruits.

By adding these figures together, it will be found that on a peace footing the Swedish Army consists of 2,606 officers or clerks, 1,797 sergeants, 6,947 corporals, 557 cadets, 7,792 volunteers, and 22,352 recruits, or altogether 42,031 officers, non-commissioned officers, and men. It may be added that 60,000 men are called out for training each year.—*Précis from Revue du Cercle Militaire.*

UNITED STATES.—*Grand Manœuvres*.—These manœuvres for the land forces took place at Fort Riley, in Kansas, from the 20th September to the 8th October. Although the number of troops assembled at this post amounted to nearly the strength of a division, the exercises could in no way be compared to the ordinary divisional manœuvres of European Powers. As a matter of fact, there was no General Idea, but merely a series of different schemes for each day, or even half day. It would, therefore, be both useless and idle to enter into the details of these somewhat unimportant operations; we will thus confine ourselves to generalities, which may possibly prove more instructive. The corps assembled at Fort Riley consisted of the 6th, 18th, and 22nd Infantry and the 4th and 8th Cavalry Regiments, 1 Engineer battalion, the 6th, 7th, 19th, and 20th Field Artillery Batteries, the 28th Mountain Battery, No. 3 Ambulance, the 3rd Field Hospital, and a signaller's detachment, the whole under the command of Major-General Bates. The contingent of the National Guard was formed of 2 infantry regiments and 2 field batteries from Kansas, a Colorado and an Arkansas battalion. Advantage was taken of this concentration to make certain units carry out experimental marches: the 2nd Infantry Regiment, for instance, had to do eleven marches through a most difficult country in order to reach their destination. The following appear to be the chief observations to be made on the manœuvres:—

1. *Great weight given to details of field service.* A great deal of time was devoted to the formation and to the duties of outposts, guards, and advanced and rear guards.

2. *The relatively large amount of time the director of the manœuvres found necessary to devote to close formations.* This was found to be essential, owing to the want of cohesion of units unaccustomed to combined movements. As everyone knows, units have hitherto been very widely split up and scattered in the United States Army.

3. *The serious inconvenience arising from the dearth of horse artillery batteries to attach to cavalry detachments.* When it was attempted, on the 30th September, to form a cavalry brigade to attack a convoy, it was found necessary to attach a mountain battery to it, as the lightest and most mobile unit of the United States Artillery.

4. *Condition of the troops.* Notwithstanding the high temperature during the nineteen days of the manœuvres, the proportion of sick was only three per cent.

The artillery showed a dash which makes it the most brilliant arm of the Union: its movements were carried out with extreme rapidity and with a profound contempt for

obstacles. The daring of the 20th Battery, on the 26th September, in dragging their guns by hand up an apparently inaccessible hill was the subject of much remark. It may be added that the Fort Riley manoeuvres furnished a further proof that the National Guard is not a force that can be blindly depended upon for either its endurance or zeal. The majority of the Militia officers invited to assist at the manoeuvres had not the requisite patience to put up with the hardships, and left before the conclusion of the operations. As regards the two Kansas regiments, discouraged by the incessant rain with which they were received on their arrival in camp, they literally melted away in the hands of their chiefs. The men simply went home either individually or in parties, and the remainder had to be sent back without the brigade having taken part in more than one exercise. The War Minister and his colleagues will evidently have to make long and persevering efforts to introduce grand manoeuvres, as a regular thing into the National Guard. On the other hand, an experience such as this is not calculated to encourage the different States to vote funds for the movements of troops for this sort of operations.—*La France Militaire*.

CORRESPONDENCE.

‘COMPLEXITY IN ARMY ACCOUNTS.’

To the Editor of the JOURNAL of the ROYAL UNITED SERVICE INSTITUTION.

SIR,—I venture to submit a few remarks on the subject of Captain G. W. Redway's lecture on “Complexity in Army Accounts,” and the discussion thereon, published in the October number of the *JOURNAL* of the Institution. I regret I was not present when the lecture and discussion took place.

There is much to be said in respect of both the delinquencies of Army and Departmental officers, and those of check and audit officers—both are human.

It is undoubtedly true that the former class are, as a body, too ready to ignore their responsibilities in the matter of the rendering of their accounts correctly: there are of course very many notable exceptions. They think and say that, as there is a check and audit officer ready to correct their errors, they need not take too much pains to be accurate, or give much time to this end. Moreover, they are frequently found ready to sign necessary certificates without first seeing for themselves that they are borne out by facts. On the other hand, the multiplicity of certificates required is equally undoubtedly a grievance with such officers. The number of certificates might easily be curtailed, and no counter-signatures should be required to any certificate: the original signing officer should be held responsible, both pecuniarily and under military discipline for any inaccuracy detected in a certificate he signs.

In India two forms of military accounts have recently been recast on the above lines, and those for regimental pay lists and general statements of accounts, among others, have been made to include all necessary information required by the Audit Department, and all certificates, and there is but one signature required to the lot, that is to say at the end of the form, which is given on honour; no separate vouchers or certificates are needed as a rule. This has been the outcome of recommendations from committees composed of executive and account officers combined. Something similar might be done at home.

Colonel P. H. Smith's remarks, published at page 1274 of the *JOURNAL*, seem to me unfair and irrelevant. He speaks of an instance which he states occurred a "considerable time ago" in India, which hardly seems applicable to the subject under discussion, which was Army accounts of the present time. Moreover, I venture to doubt the accuracy of Colonel Smith's memory on the point. Everyone who has been in India knows that there an "objection" is first raised by the Audit Department, and if it cannot be answered, then only a retrenchment follows, and several objections and replies are allowed before such retrenchment issues. Curiously, too, Colonel Smith is guilty of inconsistency when he complains, in the case he cites, that there is "no system of check or audit," and yet objects to check and audit. Such an instance as Colonel Smith quotes *could* only have occurred a *very* "considerable time ago."

HURLOCK PRITCHARD, Colonel,

late Accountant-General, Military Department
Government of India.

Camberley.

21st October, 1902.

NAVAL AND MILITARY CALENDAR.

OCTOBER, 1902.

- | | | | |
|-----|--------|---|---|
| 1st | (W.) | 12th Brigade Division R.F.A. arrived at Southampton from Cape Town in the "Avoca." | |
| 2nd | (Th.) | H.M.S. "Intrepid" commissioned at Portsmouth for Mediterranean. | |
| " | " | H.M.S. "Calypso" left Devonport for Newfoundland. | |
| " | " | 4th Bn. Durham Light Infantry (Militia) arrived at Southampton from Cape Town in the "Roslin Castle." | |
| " | " | 2nd Bn. Cheshire Regiment | } Left Cape Town for England in the "St. Andrew." |
| " | " | 2nd Bn. East Kent Regiment | |
| 3rd | (F.) | H.M.S. "Crescent" paid off at Portsmouth. | |
| " | " | H.M.S. "Hawke" paid off at Chatham. | |
| " | " | "J" Batt. R.H.A. | } Left Point Natal for Bombay in the "Ionian." |
| " | " | 3rd Hussars | |
| " | " | 2nd Black Watch | } Arrived at Southampton from S. Africa in the "Avondale Castle." |
| " | " | 3rd Bn. Leicestershire Regiment (Militia) | |
| " | " | 5th Bn. Rifle Brigade (Militia) | } Arrived at Southampton from Cape Town in the "Harlech Castle." |
| " | " | 3rd Bn. Cheshire Regiment (Militia) arrived at Southampton from Cape Town in the "Harlech Castle." | |
| " | " | 4th Bn. Royal Dublin Fusiliers (Militia) arrived at Queenstown from Cape Town in the "Cestrian." | |
| 4th | (Sat.) | Launch of second-class battle-ship "Babenberg" at Trieste, for Austro-Hungarian Navy. | |
| " | " | Martial Law in Natal was repealed. | |
| " | " | 1st Bn. Coldstream Guards | } Arrived at Southampton from Cape Town in the "Winifredian." |
| " | " | 1st Bn. Scots Guards | |
| " | " | 1st Bn. Oxfordshire Light Infantry | |

- 4th (Sat.) 1st Bn. Loyal North Lancashire Regiment arrived at Southampton from Cape Town in the "Carisbrook Castle."
- 5th (S.) "U" Battery R.H.A.
37th Battery R.F.A.
3rd Bn. Lincolnshire Regiment (Militia)
3rd Bn. Essex Regiment (Militia) } Arrived at Southampton from Cape Town in the "Cestrian."
- 6th (M.) 1st Bn. Sherwood Foresters (Nottinghamshire and Derbyshire Regiment) arrived at Hong-Kong from Cape Town in the "Wakool."
- " " 3rd Bn. Grenadier Guards } Arrived at Southampton from Cape Town in the "Lake Michigan."
- " " 1st Bn. West Riding Regiment }
1st Bn. Yorkshire Regiment }
- " " 2nd Bn. Coldstream Guards arrived at Southampton from Cape Town in the "Mohawk."
- 7th (T.) Convention signed between France and Siam.
- " " 2nd Bn. Royal Welsh Fusiliers left Hong-Kong for Bombay in the "Wakool."
- " " 68th and 88th Batteries R.F.A.
1st Field Telegraph Troop R.E.
2nd Division Telegraph Bn. R.E.
2nd Bn. Lancashire Fusiliers } Left Cape Town for England in the "Britannic."
- 8th (W.) 2nd Brigade Division R.F.A.
2nd Bn. Grenadier Guards
2nd Bn. North Staffordshire Regiment } Arrived at Southampton from Cape Town in the "Galeka."
- " " 10th Hussars } Arrived at Bombay from Cape Town in the "Lake Manitoba."
- " " 12th Lancers }
1st Bn. Royal Munster Fusiliers }
- " " 2nd Bn. King's Own Yorkshire Light Infantry left Point Natal for Malta in the "Staffordshire."
- 9th (Th.) Report of the Commission on Army Remounts was issued.
- " " 3rd Bn. East Yorkshire Regiment (Militia) } Arrived at Southampton from Cape Town in the "Greek."
- " " 6th Bn. Worcestershire Regiment (Militia) }
- " " "C" Pontoon Troop and 31st Company } Arrived at Southampton from Cape Town in the "Dunera."
- " " Royal Engineers }
1st Bn. Cameron Highlanders }
- " " 6th (Inniskilling) Dragoons } Left Cape Town for England and Ireland in the "Orissa."
- " " 1st Bn. Rifle Brigade }
61st and 65th Batteries R.F.A. } Arrived at Southampton from Cape Town in the "Sicilia."
- " " 3rd Field Troop and 29th Company Royal Engineers }
- 10th (F.) 4th (Howitzer) Brigade Division R.F.A. } Left Point Natal for Bombay in the "Syria."
- " " 5th Brigade Division R.F.A. }
- 11th (Sat.) 1st (Royal) Dragoons arrived at Southampton from Cape Town in the "Kildonan Castle."
- 12th (S.) 99th Company R.G.A. arrived at Gibraltar from Cape Town in the "Sardinia."
- " " 2nd Bn. Rifle Brigade arrived at Suez, Egypt, from Point Natal in the "Malta."
- 13th (M.) 81st Company R.G.A. left Gibraltar for Malta in the "Sardinia."
- 14th (T.) H.M.S. "Latona" commissioned at Portsmouth.

- 14th (T.) H.M.S. "Intrepid" left Portsmouth for Mediterranean.
- 15th (W.) 2nd Bn. Royal Munster Fusiliers left Cape Town for Ireland in the "Orient."
- 16th (Th.) 63rd, 81st, and 92nd Companies R.G.A. } Arrived at Malta from Gibraltar and Cape Town in the "Sardinia."
1st Bn. King's Royal Rifle Corps }
- " " 1st Division Telegraph Bn. R.E. } Arrived at Southampton
2nd Bn. Essex Regiment } from Cape Town in the
1st Bn. Royal Irish Fusiliers } "Pinemore."
- 17th (F.) 37th Company R.G.A. } Left Malta for Gibraltar
1st Bn. Lancashire Fusiliers } and England in the
"Sardinia."
- 18th (Sat.) News received that the Mad Mullah had inflicted a reverse on the British in Somaliland.
- 19th (S.) 27th and 31st Bns. Imperial Yeomanry arrived at Southampton from Cape Town in the "Manchester Merchant."
- " " "J" Batt. R.H.A. } Arrived at Bombay from
3rd Hussars } Point Natal in the
2nd Bn. Black Watch } "Ionian."
- " " 17th Lancers } Arrived at Southampton
2nd Bn. Dorsetshire Regiment } from Cape Town in the
"German."
- 21st (T.) 1st Bn. Lancashire Fusiliers arrived at Gibraltar from Malta in the "Sardinia."
- " " 1st Bn. Royal Berkshire Regiment left Gibraltar for England in the "Sardinia."
- 22nd (W.) 5th Lancers } Arrived at Southampton
13th Hussars } from Cape Town in the
"City of Vienna."
- " " 5th and 39th Batts. R.F.A. }
"A" Pontoon Troop and 17th Company } Arrived at Southampton
Royal Engineers } from Cape Town in the
18th Hussars } "Englishman."
1st Bn. Leinster Regt. (Royal Canadians) }
- " " 9th and 17th Batts. R.F.A. } Arrived at Southampton
2nd Bn. Royal Fusiliers } from Cape Town in the
1st Bn. Gordon Highlanders } "Salamis."
- " " 6th Brigade Division R.F.A. } Left Cape Town for Bom-
1st Bn. Royal Sussex Regiment } bay in the "Plassy."
- 23rd (Th.) 2nd (Prince of Wales's Own) Bombay Grenadiers, and 6 officers and 400 men 23rd Bombay Rifles, left Bombay for Aden in the "Hardinge."
- " " Hong-Kong Regiment left Hong-Kong for India, for disbandment, in the "Aratoon Apear."
- 25th (Sat.) T.M. the King and Queen drove through South London.
- " " O and P Batts. R.H.A. } Left South Africa for India
1st Bn. Liverpool Regiment } in the "Ortona."
1st Bn. Leicestershire Regiment }
- " " 1st Bn. York and Lancaster Regiment left Durban for India in the "Orotava."

- 26th (S.) T.M. the King and Queen attended a Thanksgiving Service for His Majesty's restoration to health at St. Paul's Cathedral.
- " " 37th Company R.G.A. } Arrived at Southampton
1st Bn. Royal Berkshire Regiment } from Gibraltar and Malta
in the "Sardinia."
- 27th (M.) H.M.S. "Terrible" paid off at Portsmouth.
- " " H.M. the King reviewed the Brigade of Guards, on their return from South Africa, on the Horse Guards' Parade.
- " " 2nd Bn. King's Own Yorkshire Light Infantry arrived at Malta from South Africa in the "Staffordshire."
- " " 2nd Bn. Scots Guards } Arrived at Southampton
1st Bn. Black Watch } from South Africa in the
2nd Bn. Manchester Regiment } "Michigan."
- " " 1st Bn. Leinster Regiment arrived at Queenstown, Ireland, from Cape Town in the "Englishman."
- " " 2nd Bn. East Kent Regiment } Arrived at Southampton
2nd Bn. Cheshire Regiment } from South Africa in the
"St. Andrew."
- " " 68th and 38th Batteries R.F.A. } Arrived at Southampton
1st Field Telegraph Troop R.E. } from Cape Town in the
2nd Division Telegraph Bn. R.E. } "Britannic."
2nd Bn. Lancashire Fusiliers }
- " " 4th (Howitzer) Brigade Division R.F.A. } Arrived at Bombay from
5th Brigade Division R.F.A. } South Africa in the
"Syria."
- " " 6th (Inniskilling) Dragoons } Arrived at Southampton
1st Bn. Rifle Brigade } from Cape Town in the
"Orrisa."
- " " 2nd (Prince of Wales's Own) Bombay Grenadiers, and 6 officers and 400 men 23rd Bombay Rifles, arrived at Aden from Bombay in the "Hardinge"
- 28th (T.) H.M.S. "Hood" arrived at Plymouth.
- 29th (W.) Launch of H.M.S. "Cornwall" at Pembroke.
- " " 1st Bn. Durham Light Infantry left Point Natal for Bombay in the "Assaye."
- 30th (Th.) 3rd Bn. Royal Warwickshire Regiment left Malta for Bermuda in the "Staffordshire."
- 31st (F.) 5th and 39th Batteries R.F.A. } Arrived at Southampton
"A" Pontoon Troop and 17th Company } from Cape Town in the
Royal Engineers } "Englishman."
18th Hussars }

FOREIGN PERIODICALS.

NAVAL.

ARGENTINE REPUBLIC.—*Boletín del Centro Naval*. Buenos Aires: August, 1902.—“The Application of the Calculation of Probabilities in Determining the Weights of Chronometers.” “Naval Gunnery.” “The Machinery of a War-ship in War-time.” “Bilge Keels.” “Minute by the Minister of Marine” (*concluded*).

September, 1902.—“Naval Gunnery” (*concluded*). “Inland Navigation in relation to other Means of Transport.” “Combined Operations” (*continued*). “The German Fleet: The Rival to the English Fleet in the Future.” “The Gunner's Manual” (*continued*).

AUSTRIA-HUNGARY.—*Mittheilungen aus dem Gebiete des Seewesens*. No. XI. Pola: November, 1902.—“The Training Question in the Mercantile Marine.” “The Methodical Management of Ships' Boilers.” “On the Morality of Submarine Warfare.” “A Study by a Russian Officer on the Organisation for Landing Troops.” “Improvements in Steamers for Navigating Shallow Rivers.” “Foreign Naval Notes.”

BRAZIL.—*Revista Marítima Brasileira*. Rio de Janeiro: September, 1902.—“The Mercantile Marine and National Defence.” “On Light-houses” (*continued*). “The Coast Navigation between Bahia and Rio de Janeiro” (*concluded*). “The Barr and Stroud Apparatus for the Transmission of Orders.” “A Brief Study of Oceanography, *à propos* of the Collection of Sea Fauna.” “Service and Discipline in Our Ships of War.” “A Naval Museum.” “Modern Naval Education.”

FRANCE.—*Revue Maritime*. Paris: October, 1902.—Has not yet been received.

Le Yacht. Paris: 4th October, 1902.—“The American Manœuvres.” “The Administrative Regulation relating to the Mercantile Marine.” “President Roosevelt and the U.S. Navy.” “Launch of the Armoured Cruiser ‘Kléber.’” 11th October.—“State and Private Dockyards.” “The German Battle-ship ‘Wettin.’” “The Mercantile Marine.” “The Question of Free Ports.” 18th October.—“Naval Education.” “The Russian Manœuvres.” “Re-organisation of the Sea Mail Service.” “The Battle-ship ‘Saint Louis.’” 25th October.—“Points d'Appui.” “The Mercantile Marine, French and Foreign.”

Le Moniteur de la Flotte. Paris: 4th October, 1902.—“The Evolution Calibres.” “The Return of the Two Arctic Expeditions of Peary and Sverdrup.” “Colonial Notes.” 11th October.—“The Ocean Trust.” “The Commissariat of the Navy.” “The Experience of the ‘Kléber.’” “The Too Frequent Changes of Crews.” “The Point d'Appui of the Fleet in the West Indies.” “Practical Exercises with Submarines.” 18th October.—“The Japanese Navy.” “Coast-Defence Ships and Submarines.” “Decrees Creating a Corps of Administration of the Inscription Maritime.” 25th October.—“To Avoid Collisions.” “Naval Alliances.” “The English Manœuvres in the Mediterranean.” “The Navy in

Parliament." "The 'Tage' and 'Suchet' at Martinique." "La Marine Française." "The Minister of Marine in Italy." "The Ocean Trust and Our Trans-Atlantic Steamers." "A Table of the Ships of the French Fleet, with their Types of Boilers." "Contribution to the Study of the Engineer Question." "The Naval Reserves in England." "The Submarines." "Foreign Naval Notes," 15th October.—"Military Engineering at Bizerta." "Madeira, the Key of the Mediterranean." "The Personnel embarked in our Ships: *à propos* of the Project for Reducing the Strength of the Effectives." "The Anglo-Japanese Alliance." "Corea and Russia." "Tactical Exercises of the French Submarines." "The Defence of India." "A Railway through Beluchistan." "The English Government, the Cunard Company, and the International Marine Company."

GERMANY.—*Marine-Rundschau*. Berlin: November, 1902.—"The Venetian Fleet under Pietro Barbarigo in 1618." "The U.S. Naval Manœuvres of 1902." "The Cruise of the 'Falke' up the Amazon." "The Destruction of the Haytian Gun-boat 'Crête à Pierrot' by H.I.G.M. Gun-boat 'Panther.'" "Naval Historical Incidents out of the German Past." "Compass Experiments and Improvements in the German Navy during last Year." "The Salvage of the Steamer 'Emil Beremy' in Danzig Bay."

ITALY.—*Rivista Marittima*. Rome: October, 1902.—"Admiral Nelson at Maddalena and the Sardinian Navy of that Time." "Coaling at Sea." "On the Curves of Ships." Letter to the Director:—"First-class Torpedo-boats." "Foreign Naval Notes."

PORTUGAL.—*Revista Portuguesa, Colonial e Maritima*. Lisbon: October, 1902.—"Intercourse between Flanders and Portugal, from 1094—1682" (*continued*). "Penal Transportation and Colonisation" (*continued*). "German Colonies." "The Azores: To What Part of the World do they Belong?" "Foreign Naval Notes."

SPAIN.—*Revista General de Marina*. Madrid: November, 1902.—"The New French First-class Battle ship 'République.'" "The History of an Unused Dockyard, Channels which are Silting up, and a Bay which is Disappearing." "Medical Impressions of the Cruise on board the Cruiser 'Rio de la Plata' to the South American States." "The Advantage of the Study of Contemporary Naval History." "The Theory and Practice of the Executive Naval Officer" (*concluded*). "The 'Stirling' Boiler for Ships." "The Casemates for the 14-centimetre Guns mounted on board the Armoured Cruiser 'Cardinal Cisneros'" (*continued*). "Wireless Telegraphy." "The 'Kaselowsky' Registering Apparatus." "Foreign Naval Notes."

UNITED STATES.—*Proceedings of the United States Naval Institute*. No. 3. Annapolis: September, 1902.—"The Employment of Petty Officers in the Navy." "The Training of Landsmen for the Navy." "Some Thoughts on Our Ordnance Material." "On Naval Operations of the Crimean War." "Military Operations and Defences of the Siege of Peking." "Some Experiences on board the U.S.S. 'Manilla.'" "Graphic Solution in Coast Navigation." "Methods for Finding the Intersection of Two Sumner Lines." "Foreign Naval Notes."

MILITARY.

AUSTRIA-HUNGARY.—*Militär-Zeitung*. Vienna: 8th October, 1902.—"The Coming Recruit Contingent The Launching of the Flag-ship 'Babenberg.'" "The

"Utilisation of the Experience gained from the South African War." "The New Article of War for the German Army," 16th October.—"The New Course for Landwehr Cavalry Officers." "The New Regulations regarding the Increase and Promotion of Russian General Staff Officers." 24th October.—"The Ersatz Reservists." "Field Howitzers." "The Raising of the Effective Strength." "New Regulations for the Training of the Russian Infantry and Cavalry in Artillery Duties."

Mittheilungen über Gegenstände des Artillerie- und Genie-Wesens. Vienna: October, 1902.—"Computation of Universal Shooting Tables, and their Use in the Solution of Examples in Musketry Instruction," (*continued*). "Hasty Secret Surveys."

BELGIUM.—*Bulletin de la Presse et de la Bibliographie Militaires.* Brussels: 15th October, 1902.—"The Influence of Shields on the Evolution of Field Artillery *Matériel* and on Tactics" (*continued*). "Cavalry Scouting from the Revolution to the Present Day" (*continued*). "Military Events in China 1900-01" (*continued*). 31st October, 1902.—"Military Events in China, 1900-01" (with sketch, *continued*). "Influence of Shields on the Evolution of Field Artillery *Matériel* and Tactics" (*continued*). "Cavalry Scouting from the Revolution to the Present Day" (with sketch, *continued*).

FRANCE.—*Revue du Cercle Militaire.* Paris: 4th October, 1902.—"Scheme for the Transport of Light Bridging Material" (with sketch). "Notes on Japan." "Three Years' Campaigning in the Basin of the Chad, 1899-1901" (*continued*). 11th October.—"Notes on Japan" (*continued*). "Examinations on Military Legislation." "Three Years' Campaigning in the Basin of the Chad, 1899-1901" (1 map, *concluded*). 18th October.—"An Anniversary—Auerstädt." "Notes on Japan" (*concluded*). "Medical Statistics of the Austro-Hungarian Army for 1900." "Tactical Lectures." 25th October.—"An Anniversary—Auerstädt" (with map and sketch, *continued*). "A few Words on the German Manœuvres of 1902."

Le Spectateur Militaire. Paris: 1st October, 1902.—"The Campaign of 1813" (*continued*). "Plateau de Langres, Faucilles, and Haute-Saône" (*continued*). "Reciprocity Amongst Soldiers" (*continued*). "History of the Gardes Françaises" (*continued*). 15th October.—"Our Policy in Morocco." "The Campaign of 1813" (sketch, *continued*). "Plateau de Langres, Faucilles, and Haute-Saône" (*continued*). "History of the Gardes Françaises" (*continued*). "Reciprocity Amongst Soldiers" (*continued*).

Revue d'Artillerie. Paris: September, 1902.—"An Italian and a German Opinion on Q.F. Guns" (*concluded*). "Construction of Batteries in Germany and in Austria-Hungary" (*concluded*). "21-c.m. and 120-m.m. Skoda Mortars."

October, 1902.—Has not been received.

Revue du Génie Militaire. Paris: September, 1902.—"The New Military Bridge for Repairing large Breaches and for the Passage of Torrents." "The Execution and Drawing-up of a Colonial Railway Scheme."

October, 1902.—"Study of a New Military Bridge." "Dynamics of Free Balloons." "The Execution and Drawing up of a Colonial Railway Scheme" (*concluded*).

Revue de Cavalerie. Paris: September, 1902.—"On the Development of the Instruction and of the Character of the Officer." "A Page from the History of the Royal Piémont Cavalry (23rd Dragoons)—Its Stay in the Saône Camp in 1730" (*concluded*). "Method of Horse Training in the Italian Army" (*concluded*). "An Episode in the Battle of Beaumont." "The Ostend-Brussels Ride."

October, 1902.—Has not been received.

Revue Militaire. Paris: October, 1902.—“The Possibility of a Russian Campaign against India.” “Machine Gun Detachments in the German Army.” “New Law on the Status of Non-commissioned Officers in Italy.” “Studies of the South African War, 1899-1900” (*continued*).

Journal des Sciences Militaires. Paris: October, 1902.—“The *Rôle* of Langres in Past and Future Invasions” (*continued*). “Archives and Correspondence of Divisional General Jean Hardy” (*continued*). “In Salah and Tidikelt” (*concluded*). “The Campaign of 1814” (*concluded*). “The Service of Two Years—Recruitment of Reserve Officers.” “Infantry in Conjunction with Cavalry” (*concluded*). “Wars in the Alps” (*continued*).

Revue d'Histoire. Paris: October, 1902.—“The Operations at Denain.” “The Blockade of Brest, 1793 to 1805.” “The War of 1870-71—The 8th August in Lorraine” (*continued*).

GERMANY.—*Militär-Wochenblatt.* Berlin: October, 1902.—“Memorial Stone in the High Church.” “This Year's Detachment Manœuvres in the St. Petersburg Military District” (*concluded*). “Exhibition of War *Matériel* at Düsseldorf in 1902” (*continued*). “Intelligence from the French Army” (with sketch). 4th October.—“The Cover Problem.” “A Study from the Second Part of the Campaign of 1870-71.” “Russian Experiments with Captive Balloons in the Field.” “A New Article of War for the Army.” “This Year's Manœuvres of the Italian Army.” 8th October.—“Some Thoughts on Machine Gun Shooting Practice” (with 2 sketches). “Experiences of the new Attack Formation at the conclusion of the Year's Training.” “Exhibition of War *Matériel* at Düsseldorf in 1902” (*continued*). 11th October.—“Authentic Contributions to and Researches into the History of the Prussian Army.” “Some Thoughts on Machine Gun Shooting Practice” (*continued*). “The Latest Regulations regarding the Increase and Promotion of the Russian General Staff.” “Intelligence from the Italian Army.” 15th October.—“The Progress of the Grand Russian Manœuvres at Kursk” (with sketch). “Some Thoughts on Machine Gun Shooting Practice” (*concluded*). “Exhibition of War *Matériel* at Düsseldorf in 1902” (*concluded*). 18th October.—“The Value of Drill and its Limitations.” “Regensburg, 1809.” “Intelligence from the Belgian Army.” “New Regulations for the Training of Russian Infantry and Cavalry in Artillery Duties.” 22nd October.—“The Imperial Manœuvres of 1902” (*continued*). “Wörth, with special Reference to the Battle near the Niederwald.” 25th October.—“The Two-Hundredth Anniversary of the 94th (Grand Duke of Saxony's) Thuringian Infantry Regiment.” “The Autumn Campaign of 1813.” “Paper Chases.” 29th October.—“The New English Field Artillery Regulations for 1902.” “The Autumn Campaign of 1813” (*continued*). “The Imperial Yeomanry of the English Army.”

Internationale Revue über die gesammten Armeen und Flotten. Dresden: October, 1902.—“Military and Naval Intelligence from Austria-Hungary, France, Germany, Great Britain, Italy, Japan, Mexico, Roumania, Russia, and the United States.” *Supplement 33*.—“Study of New Infantry Tactics.” *French Supplement 43*.—“Cavalry in Siege Warfare.” “Artillery at the Düsseldorf Exhibition of 1902” (with 2 plates). “New Arms Demand New Formations.”

Jahrbücher für die Deutsche Armee und Marine. Berlin: October, 1902.—“The Constitution of Forces in Battle.” “Field Guns Recoiling on their Carriages and the Steel Shield.” “The so-called Boer Tactics.” “Fortress Warfare in Theory and in

Practice." "Our District Commanders and District Officers." "The Method for Increasing the Mobility of Field Artillery." "French Horse-Breeding." "The War Matériel at the Düsseldorf Exhibition of 1902."

ITALY.—*Rivista di Artiglieria e Genio*. Rome: October, 1902.—"The Efficacy of Shrapnel Fire." "Attack and Defence of Fortified Positions." "An Old School." "Notes on the Geodetical Connection of Sardinia with the Tuscan Archipelago." "The Modern Japanese Rifle." "Armour Plates at the Düsseldorf Exhibition." "Krupp Experiments in regard to Field Artillery." "The Question of the New Belgian Field-gun." "Lessons to be learnt from the South African War." "Foreign Military Notes."

Rivista Militare Italiana. Rome: October, 1902.—"General Enrico Cosenz: Obituary Notice." "General Count Pianelli: Obituary Notice." "From Weissenburg to Sélan in 1870." "The New Infantry Drill Regulations for the Austro-Hungarian Army."

PORTUGAL.—*Revista de Engenharia Militar*. Lisbon: August, 1902.—"Electrical Illumination of the Fort Don Carlos I." "Automobiles." "The Quarters of Infantry Regiments" (*continued*).

September, 1902.—"The Installation of 28-cm. Krupp Guns at St. Juliao da Barra and Bom Succasso Forts." "Proposal for the Formation of an Intrenched Camp at Fratel." "Military Monuments." "The Quarters of Infantry Regiments" (*continued*).

Revista de Infanteria. Lisbon: October, 1902.—"Pay and Allowances." "The German Rifle: 1898 Model." "Equipment of Infantry." "The Cacaiores Battalions." "South Africa." "The Manœuvres of the 2nd Division." "The Autumn Manœuvres of the 1st Division."

SPAIN.—*Memorial de Ingenieros del Ejército*. Madrid: September, 1902.—"A Theoretical and Practical Study of the Spanish Pontoon-Train Regulations" (*continued*). "The Outlining of Trajectories" (*concluded*). "The Establishment of Filters (Pasteur System) in Military Buildings" (*concluded*).

October, 1902.—"The Centenary of the Corps of Engineers." "A Theoretical and Practical Study of the Spanish Pontoon-Train Regulations" (*concluded*). "The Outlining of Trajectories" (*concluded*).

Revista Técnica de Infanteria y Caballería. Madrid: 1st September, 1902.—"How Military Catastrophes come about." "A Glorious Record of the Spanish Cavalry." "Some Data referring to the Empire of Morocco." "A Study on the Spanish Mauser, Model 1893." "Military Science in Athens: Lectures on Dirigible Balloons, and Tendencies in the Instruction of Cavalry and Infantry Officers." 15th September.—"The Sergeants." "A Glorious Record of the Spanish Cavalry" (*continued*). "Naval Forces." "The Cavalry at Froeschwiller." "A Study on the Spanish Mauser, Model 1893" (*continued*).

1st October, 1902.—"Our Cavalry." "A Glorious Record of the Spanish Cavalry" (*continued*). "Some Data referring to the Empire of Morocco" (*continued*). "Military Science in Athens: Lecture on Dirigible Balloons." "The English and French in the Peninsula."

15th October, 1902.—"Lessons of a War." "A Glorious Record of the Spanish Cavalry." "Some Data referring to the Empire of Morocco" (*continued*). "The

Cavalry at Froeschwiller" (*continued*). "A Study on the Spanish Mauser, Model, 1893" (*continued*). "Military Decorations."

SWITZERLAND.—*Revue Militaire Suisse*. Lausanne: October, 1902.—"The Enigma of Ligny and Waterloo" (with map). "In the Artillery" (with 2 plates). "Reading of Country" (*concluded*). "The Manœuvres of the IVth Army Corps." "Balloonists at the Manœuvres of the IVth Army Corps."

UNITED STATES.—*The United Service*. New York: October, 1902.—"The Training of Army Officers." "A Forgotten American Humourist." "A Tangled Web" (*continued*). "Organisation of Coast Defence." "Lessons of the South African War." "The Combined Navy and Army Manœuvres." "The Loss of the U.S. Steamship 'Mississippi.'" "Service Salad." "Hon. Elihu Root, Secretary of War."

Journal of the United States Artillery. Fort Monroe: September-October, 1902.—"Report on the Mounts and Means of Ammunition Supply at the R.F. Gun Batteries at Fort Pickens and Fort McRee, Florida." "A Set-back Chart for Mortars." "A Predicting and Set-back Ruler." "Fighting Books." "Defence for Secondary Forts against Probable Enemies, based upon an Appreciation of Peculiarities of the Personnel and *Matériel* of such Enemies." "Thoughts on Coast Defence suggested by the Boer War." "Professional Notes." "Book Reviews."

NOTICES OF BOOKS.

The Great Boer War. By ARTHUR CONAN DOYLE. With maps. Complete edition. London: Smith Elder & Co., 15, Waterloo Place. 1902. Price, 10s. 6d.

This most recent and "Final Edition" of Sir Arthur Conan Doyle's excellent history of the late war carries the narrative from October, 1901, to the conclusion of hostilities on the surrender of the Boer commandos. Some fresh matter has also been introduced amongst the original chapters, notably the notorious Colenso heliogram from Sir Redvers Buller to Sir George White. Of Colenso, in an amended summary of his views, the author says:—"A more unsatisfactory and in some ways inexplicable action is not to be found in the range of British military history, and the fuller the light which has been poured upon it the more extraordinary does the battle appear. There are a preface and a sequel to the action which have put a severe strain upon the clarity which the British public has always shown that it is prepared to extend to a defeated general. The preface is that General Buller sent word to General White that he proposed to attack upon the 17th, while the actual attack was delivered on the 15th * * *. The sequel is more serious. Losing all heart at his defeat, General Buller, although he had been officially informed that White had provisions for seventy days, sent a heliogram advising the surrender of the garrison."

This criticism, confined as it is to a statement of plain facts beyond the reach of controversy, is absolutely fair, and the commendation of Sir George White's reply which then follows is no more than just to that brave old soldier who kept the flag flying in spite of everything. Truly "White's first reply deserves to live with the anecdote of Nelson's telescope to his blind eye"! Nor is the praise awarded to Sir George White for what he did well weakened, but rather the contrary, by the impartial

views expressed upon his conduct taken as a whole. There is no attempt made to gloss over the obvious failure to take any steps for the defence of Ladysmith until after the troops had been beaten back into the place, and when it was too late to secure the important outlying positions that if held might have rendered the conditions of the blockade far less onerous to the besieged, and the influence of Sir George White's forces upon the campaign far less circumscribed—more especially if the non-combatants had been sent down the country. Indeed, one of the most pleasing of the many valuable characteristics of the whole narrative is the absolutely judicial spirit in which both favourable and adverse evidence is recorded in reference to individuals, detachments, corps, and armies. Thus, in spite of the very high opinion of Sir John French entertained by the author in common with the rest of his countrymen, the cases of failure—from what causes it matters not—at Poplar Grove, Abram's Kraal, etc., are duly recorded with a frankness equal to that displayed in describing and commending the truly masterly campaign about Colesberg, and the admirable tactics employed during the ride to Kimberley. So, also, Ian Hamilton, whilst receiving full credit for his valuable services as a column commander and otherwise, is nevertheless justly debited with his neglect to entrench his section of the Ladysmith defences—a neglect which went near to costing us very dear indeed.

In reference to those very distinguished unfortunates of the campaign, Gatacre and Colville, it would, however, seem as if Dr. Conan Doyle has not acquired the utmost information. Otherwise he would scarcely have said of the former, that after Reddersburg "this fresh mishap to his force made the continuance of his command impossible." Actually, however guilty Gatacre may have been in respect of defective organisation in the case of the Stormberg episode, his responsibility for Reddersburg appears from the evidence to have been strictly limited to the fact that the troops engaged formed a part of the forces over which he exercised a limited jurisdiction. At all events, Sir William Gatacre proceeded to his command at Colechester on his return home, and still retains that command. Therefore, although he may have been rejected as *unlucky*, it is clear that he was not, and is not, regarded as *incompetent*. In regard to Sir Henry Colville, the author falls into the common error of ignoring the influences of time and distance when discussing the question of effective intervention during the Sanna's Post disaster and afterwards. Consequently the apologies for Colville are less strong than they might have been. But in the case of that very Bayard of the war, the chivalrous Methuen, whilst everything is said that military knowledge or popular opinion can urge against the methods of Modder River and Magersfontein, even greater care is taken to record the skill as well as gallantry and devotion to duty displayed in the later operations up to the misfortune at Tweebosch. In reference to Tweebosch, Sir Arthur quotes the views of a soldier who served under this indefatigable leader: "If you hear anyone slang him, you are to tell them that he is the finest general and the truest gentleman that ever fought in this war."

The details of the hard fighting which marked many of the actions fought during the final period of the driving operations are contained in the additional chapters at the end of the volume. In these the later events are described with the same brilliant success achieved in the earlier narratives. The indefeasible evidence obtained from the survivors of Tafelkop compels the author to record the malpractices of the Boers as to wearing British uniforms and shooting the wounded. Here, however, as in other cases, Sir Arthur rightly bids us refrain from condemning the whole nation upon account of the crimes of a few ruffians. That such things were, had to be told; but they are past, and though hard to forget, they must now be forgiven.

In the last three pages is a brief but particularly able summary describing the Imperial results of the war and their particular application to South Africa itself. These weighty words cannot here be quoted, but they deserve to be carefully read and pondered over. Victory has been gained at a great price, and it now remains for us to understand and to perform our duty. A consistent policy, guided by common sense, firmness, and justice, is indispensable; and the lack of such in the past has been the primary origin of every evil that South Africa has sustained—including a terrible war. Even during the course of hostilities we failed to see that "mild" remedies are often the most cruel as well as the most costly. For example: had a selection of the more important men amongst the Cape rebels captured by Pilcher near Douglas in January, 1900, been hanged forthwith, and their property declared forfeit to the Crown, there would have been no more "Cape Rebels," and at least 20,000 British and Boer lives, and £100,000,000 might have been saved. Similarly, by allowing sedition to flourish in relatively influential circles at the present time, we may not improbably be now laying up for ourselves a store of future trouble.

Meanwhile, Sir Arthur Conan Doyle has placed the bulk of our nation under a very great obligation by providing a popular history of the war of the very highest class, at a price which renders it generally accessible. On technical matters the author is not always quite sound, but this is of little consequence, since the military reader can detect the errors for himself, as also can the thoughtful civilian who considers the various allegations by the light of recent events. The effect upon other persons is unimportant. Even Sir Arthur Conan Doyle himself has now come to realise that training and discipline are essential to making efficient fighting men of those who have lost the natural instinct retained by a primitive race such as the Boers, and that even the latter as they improved in discipline, as the result of experience in actual war, became gradually far more formidable than at first. Indeed, the prolongation of the war has proved to us a blessing in disguise, since it has prevented us from falling complete victims to a number of most plausible yet wholly pernicious and extremely dangerous fallacies. For example: the Boers have taught us that the shock action of mounted troops is by no means obsolete as an effective tactical resource, and that the theory of individuality must be subject to the dictates of practical common sense—or in other words, that whilst the skirmisher must be able to shift for himself, he must yet be accustomed to obey orders instantly, and to act in close concert with his comrades, if the fleeting opportunities of battle are to be effectively seized.

For King and Country, 1899-1902. London: Eyre and Spottiswoode, 1902.

This work is not, as might have been supposed from the title, a stirring account of the great contest in South Africa, but it is a not less important statistical account of the funds in aid of the soldier and his family which were raised from various sources during the war. The Mansion House was the medium through which the general appeal to the nation for funds was made, and this book shows how general and unprecedented was the expense at home and abroad. This book is compiled by Colonel Sir James Gildea, C.V.O., C.B., whose work in connection with the relief of our sailors and soldiers is well-known throughout the country. Copies of the book will be supplied on application from 23, Queen Anne's Gate, Westminster.

PRINCIPAL ADDITIONS TO LIBRARY DURING OCTOBER, 1902.

Heere und Flotte der Gegenwart—Frankreich, die Flotte. By Vice-Admiral C. F. BATSCHE and Captain MEUSS. 8vo. Berlin. 1900.

- Heere und Flotte der Gegenwart—Italien, die Flotte.* By Vice-Admiral PASCHEN. 8vo. Berlin, 1902.
- Das Buch vom Eisernen Kreuze.* By L. SCHNEIDER. Royal 4to. Berlin 1872.
- Among Swamps and Giants in Equatorial Africa.* By Major H. H. AUSTIN. 8vo. 15s. London, 1902.
- An Historical Account of the British Army and of the Law Military.* By E. SAMUEL. 8vo. London, 1816.
- Precedents in Military Law, including the Practice of Courts-Martial.* By Lieut.-Colonel HOUGH. 8vo. London, 1855.
- Smithsonian Institution, Bureau of Ethnology. Kathlamet Texts.* By FRANZ BOAS. 8vo. United States. Washington, 1901.
- The Eldorado of the Ancients.* By Dr. CARL PETERS. 8vo. 21s. London, 1902.
- The Home Life of Borneo Head-Hunters, Its Festivals and Folk-Lore* By W. H. FURNESS, 3rd. 8vo. 42s. Philadelphia, 1902.
- Glimpses of Three Nations.* By G. W. STEEVENS. 8vo. New York, 1900.
- England and Germany.* By ERICH MARCKS. 8vo. London, 1900.
- Instruction Pratique sur le Service de la Cavalerie en Campagne.* Official. Demy 12mo. Paris, 1902.
- The Military Forces of the British Colonies and Protectorates.* Compiled in the Intelligence Division, War Office. 8vo. 2s. London, 1902.
- The Great Boer War.* By A. CONAN DOYLE. Complete Edition. 8vo. 10s. 6d. London, 1902.
- Emploi de l'Artillerie à Tir Rapide.* G. ROUQUEROL. 8vo. Paris, 1901.
- Minutes of Proceedings of the Institution of Civil Engineers.* Vol. CXLIX. 8vo. London, 1902.
- Règlement Provisoire de Manœuvre de l'Artillerie de Campagne.* 2 vols. Official. Crown 8vo. Paris, 1902.
- Le Nouveau Règlement de la Cavalerie Italienne.* By Lieut.-Colonel PICARD, 9th Cuirassiers. 8vo. Paris, 1902.
- La Cavalerie Allemande aux dernières Grandes Manœuvres et d'après ses Règlements.* By Lieut.-Colonel PICARD, 17ième Dragons. 8vo. Paris, 1902.
- Mémorial du Génie Maritime.* 3ième Série. Fascicule IV. Official. 8vo. Paris, 1902.

- Geschichte der Befreiungs-Kriege 1813-1815—Herbstfeldzug 1813.* By Major Friederich. Vol. I. 8vo. Berlin, 1903.
-
- The Relations of Geography and History.* By Rev. H. B. GEORGE. Crown 8vo. 4s. 6d. London, 1901.
-
- My Adventures during the late War, 1804-14.* By Captain D. H. O'BRIEN, R.N. Edited by C. OMAW. Crown 8vo. 7s. 6d. London, 1902.
-
- The Campaign of Adowa and the Rise of Menelik.* By G. F. H. BERKELEY. 8vo. 7s. 6d. London, 1902.
-
- British Nigeria—A Geographical and Historical Description.* By Lieut.-Colonel A. F. MOCKLER-FERRYMAN. 8vo. 12s. 6d. London, 1902.
-
- The Enemies of England.* By Hon. G. PEEL. 8vo. 12s. 6d. London, 1902.
-
- The Pursuit of the "Mad" Mullah.* By Captain M. MCNEILL. 8vo. 6s. London, 1902.
-
- The Life of James, Duke of Ormond.* By THOS. CARTE. 6 Vols. 8vo. Oxford, 1851.
-
- L'Esprit, La Lettre, et L'Évolution des Idées d'un Réglement de Cavalerie.* By A. A. 8vo. Paris, 1901.
-
- Instruction des Cadres de l'Escadron.* ANON. 8vo. Paris, 1900.
-
- Des Corps de Cavalerie—Étude sur l'Emploi de la Cavalerie en Grandes Masses.* By P. S. 8vo. Paris, 1902.
-
- Dressage et Conduite du Cheval de Guerre.* By Général JULES DE BENOIST. 8vo. Paris, 1899.
-
- Règlement du 1^{er} Janvier, 1900, sur le Service en Campagne dans l'Armée Allemande.* Translated from the German by Général PELOUX. Crown 8vo. Paris, 1900.
-
- Service d'Exploration de Service de Sureté.* By Commandant PICARD. 8vo. Paris, 1900.
-
- Manuel d'Equitation de la Cavalerie Allemande.* Translated from the German by Commandant CHABERT. 2 Vols. Crown 8vo. Paris, 1887.
-
- For King and Country.* By Colonel J. GILDEA. Demy 4to. London, 1902.

Is all that a

**LIGHT
RUNNING** *Yost*

Typewriter should be.

ITS
LIGHT TOUCH
PLEASES
OPERATORS.

ITS
QUIET WORKING
DELIGHTS
PRINCIPALS.

Send for Illustrated Booklet,
which gives full details
of Improvements.



THE YÖST
TYPEWRITER
CO., Ltd.,
50, Holborn Viaduct,
LONDON,
E.C.

HUGH REES, Ltd.,

(SUCCESSORS TO THE BOOKSELLING AND STATIONERY BUSINESS
CARRIED ON BY EDWARD STANFORD),

**Military and Naval Booksellers and Stationers,
124, PALL MALL, LONDON, S.W.**

Opposite the Carlton Hotel.

Military and Naval Books of all descriptions are kept in stock, and can be
supplied without delay.

Field Message Books, Mathematical Instruments, Clinometers, Compasses, Sketching
Boards, and Military Stationery of all kinds.

CATALOGUES POST FREE.

Over
350
in use

5 Strong Points

- VISIBLE WRITING
- EASY RUNNING
- PERFECT ALIGNMENT
- COMPACTNESS
- BALL BEARING

ROYAL BAR-LOCK
His Majesty's Typewriter Makers.
198, Upper Thames Street.
LONDON, E.C.

By the
Admiralty
and the
War Office.

IF YOU WANT-

Apply to

EYRE & SPOTTISWOODE,
EAST HARDING STREET,
LONDON,
E.C.



Deposit Accounts opened.

Standing orders received.

Lists on application. Any information.

RECENT BOOKS.

Clowes' Naval Pocket Book, 1902. Edited by L. G. CARR LAUGHTON. (Brought up to September, 1902.) The most valuable Work of Reference now available, containing a full list of Battleships, Ironclads, Gunboats, Cruisers, Torpedo Boats, a List of Dry Docks, and other valuable information concerning all the Navies of the World. Seventh year of issue. Cloth 16mo, 5s. net.

The History of China. By D. C. BOULGER, Author of "Chinese Gordon," "Sir Stamford Raffles," &c., &c. A New Edition, Revised and Brought up to Date. Containing Chapters on the Recent Concessions to the European Powers. Illustrated with Portraits and Maps. Two Vols. Demy 8vo., 24s.

A Summer in High Asia. A Summer Ramble through Baltistan and Ladakh. By Captain F. E. S. ADAIR, Author of "Sport in Ladakh." With a Chapter on Central Asian Trade by Captain S. H. GODFREY. Illustrated and a Map of the Route. Medium 8vo., cloth extra, 12s. 6d. net.

W. THACKER & CO., 2, CREED LANE, LONDON, E.C.

Contains Photographs and Plans of every War Ship in the world; a complete Silhouette System; and an International Signal Code, brought forward by those Navies which have most identified themselves OFFICIALLY with the book.

*
EDITED BY
FRED T. JANE
Author of
"The Imperial Russian Navy," etc., etc.

Only Technical
Advertisements
are
inserted.

*
Advertisement Rates and Terms
for Three Years' Contracts may be
had from—
C. GILBERT-WOOD, F.R.G.S.,
Granville House, Arundel St., Strand, W.C.

"ALL THE WORLD'S FIGHTING SHIPS"

THE ROYAL NAVY LIST.

Contains the Names of over 10,000 Officers on the Active and Retired Lists of the Royal Navy and Royal Marine Forces, together with extensive Records of War and Meritorious Services, only to be found in this work, and

LIST OF SHIPS ON ACTIVE SERVICE, WITH THEIR OFFICERS ARRANGED IN ORDER OF SENIORITY.

It is a most exhaustive work, dealing with all Departments of the Service.

PUBLISHED QUARTERLY (500 pages), Price 7s. 6d., post free.

Annual Subscription (payable in advance), £1 7s. 6d., post free.

Officers are earnestly requested to send at once their special services to the Editor.

London: **WITHERBY & CO., Publishers, 326, High Holborn, W.C.**

Sole Advertisement Contractor:—

C. GILBERT-WOOD, F.R.C.S., F.R.H.S., Granville House, Arundel St., Strand, W.C.

AROUND THE WORLD. A NEW LINE, Operating the Largest Ships in the World.

"In all the World no Trip like this."

NORTHERN STEAMSHIP CO.

Exclusively Passenger Steel Steamships.
Through 1,000 Miles of unsalted Seas.

"ACROSS AMERICA."

Great Northern Railway Line.

Library, Observation and Dining Car Route.
Valley, Plain, and Mountain Peak.

THE SHORTEST, Quickest, and most direct Route to KLONDIKE, British Columbia, ALASKA, or Kootenai Gold Fields, and all CANADIAN and American, North West and Pacific Coast Points, CHINA, JAPAN, and AROUND THE WORLD, Washington, Idaho, Montana, Dakota, MINNESOTA, MANITOBA, Tourist, Sleeping, and Dining Cars a special feature. Unequaled advantages offered the Tourist, Hunter, Rancher, Farmer, Miner, Speculator, Settler. Through Tickets issued and Berths secured via all Atlantic Steamship Lines. Passengers met on arrival in America by courteous Agents. Send for printed matter and all information.

W. M. LOWRIE, G.P.A.,
Northern Steamship Co.,
Buffalo, N.Y.

F. I. WHITNEY, G.P. & T.A.,
Great Northern Railway,
St. Paul, Min.

H. G. McMICKEN, E.T.A.,
21, Cockspur Street,
London, S.W.
Telegrams—"Trafficker, London."

NEW, THOROUGHLY REVISED, ENLARGED AND
Completed Edition
OF A. CONAN DOYLE'S "THE GREAT BOER WAR."

*EIGHTEENTH IMPRESSION, comprising over 65,000
copies printed. With Maps, large post 8vo. 10s. 6d.*

THE GREAT BOER WAR.

By A. Conan Doyle.

****** This is the first complete and connected account of the whole course of the War. It is the only history in one volume, and is indispensable to all who wish to acquire an accurate knowledge of the subject.

Daily Telegraph—"For a spirited, manly, and impartial record of the war, treated on broad lines, and with due emphasis given to the more dramatic scenes, Sir Arthur Conan Doyle's history holds the field, and, we believe, will continue to hold it against all comers."

Army and Navy Gazette.—"The work is worthy of the subject; it is a clear, comprehensive narrative of events, fairly and exactly set forth. It is the first full history, the most ambitious attempt to give an exhaustive account of the whole war; and, as such, and from its own intrinsic merit, it must hold the ground for some time to come."

London: SMITH ELDER & Co., 15, Waterloo Place, S.W.

New, Revised, and Cheaper Edition. In One Volume.

With Photogravure Portrait of VISCOUNT KITCHENER OF KHARTOUM, and 22
Maps and Plans, 8vo., 10s. 6d. net.

THE RIVER WAR:

An Historical Account of the Reconquest of the Soudan.

By **WINSTON SPENCER CHURCHILL, M.P.**

With Maps and Plans, 8vo., 12s. 6d. net.

THE PRINCIPLES OF LAND DEFENCE,

And their Application to the Conditions of To-day.

By **CAPTAIN H. F. THUILLIER, R.E.**

LONDON: LONGMANS, GREEN & CO.

Ross's Royal BELFAST Ginger Ale.

The Safest Drink in any Climate.

**All APPLICATIONS for
ADVERTISEMENT Space
in THIS JOURNAL**

... SHOULD BE MADE TO ...
The Sole Advertisement Contractor,

C. GILBERT-WOOD, F.R.G.S., F.R.H.S.,
GRANVILLE HOUSE,
ARUNDEL STREET,
STRAND, LONDON, W.C.

"POROUS, YET THOROUGHLY WATER-PROOFED."

Made on the Premises by our own Workmen.



THE "ROSCUT," Regd.
From 50/-

With "D.I.Y." Cuffs (Regd.) Devon Imperial Yeomanry.
as supplied to H.R.H. Princess Charles of Denmark

SUITABLE for Riding, Driving, Golfing, Shooting, Fishing, Yachting, or Travelling
abroad or at home. No lady or gentleman should be without one.

The distinction in shape of the "Portsmouth" and "Roscut" Coats, from the numerous imitations, is that the sleeves are with the ordinary seam at shoulder, and not like the bottle-shaped "Raglans" running up into the collar. The arm-holes are very large, giving freedom, and the sleeve straight, with the "D.I.Y." cuffs, which were of such comfort to every soldier that wore them in the South African Campaign.

Moreover, a fit can be ensured without trying on if measurements as directed are given, viz.:—Size round chest, waist, hips, length of inside seam of coat or jacket, height of figure, and a "Portsmouth" or "Roscut" shall be sent by return, or made and sent in three days.

Patterns and Prices Post Free from—

J. & G. ROSS,
227 & 228, HIGH STREET, EXETER.

Telegraphic Address: "ZUGON, EXETER."

Telephone: No. 46, EXETER.

OETZMANN & CO.,

HAMPSTEAD ROAD, W.

(Continuation North of Tottenham Court Road).

GREAT CLEARANCE

Illustrated Sale Catalogue
Post Free.

SALE

NOW PROCEEDING.

SPECIAL OFFER OF . . .

A WHOLESALE CITY MERCHANT'S
STOCK OF TABLE COVERS

At LESS than HALF PRICES.

ALSO
A SHEFFIELD MANUFACTURER'S

Stock of Electro-Silver Plate

At about ONE-THIRD ORIGINAL PRICES.

About 250 Slightly Soiled Strong Steel . . .

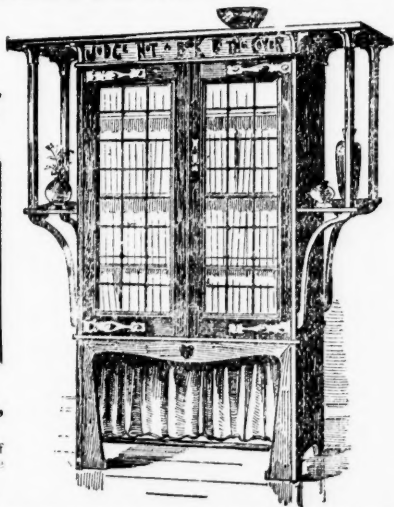
SPONGE AND SITZ BATHS,

Japanned White inside, and Oak outside.

These Baths were lent to the Government for the use of
Colonial Officers over for the Coronation, and being in use
only a few weeks are in a practically new condition.

Sponge Bath .. 10/6 18/9

Sitz Bath .. 12/6 21/-



**SOLID FUMED OAK BOOKCASE OF QUAIN
DESIGN, 4ft. 6in. wide, £5 18s. 6d.**

"ALKAN"

Cures in One Minute

BY
INHALATION

**HEADACHE,
TOOTHACHE,
FACIAL NEURALGIA,
NEURALGIA OF THE EAR.**

The Effect is Marvellous.

This simple and perfectly Harmless Remedy has cured instan-
taneously Thousands suffering from the above complaints.

OF ALL CHEMISTS AND STORES, OR OF THE PROPRIETORS,

THE ALKAN Ltd.,

GENERAL DEPÔT:

150 STRAND, LONDON, W.C.

These Testimonials are selected from
some Thousands, and command the
attention of and a trial by the sufferer.

Bracknell, Berks.

"I am pleased to be able to say
that I have used your "Alkan"
personally, as well as on several of
my friends: in every case the effect
has been marvellous, at once re-
moving the pain, and I have not
heard of any renewal of it." Wishing
you every success, I am, yours
faithfully,

F. W. DRAKE.

Ware, Hertfordshire.

"Having suffered much pain from
neuralgia, I was told by a friend to
try your "Alkan" I did so, and I
am pleased to inform you the pain
left me at once and has not
returned." I remain, yours very
truly,

C. W. RICHARDSON.

34 Waterloo, Northampton.

"When suffering from acute neural-
gia of long standing, I experienced
immediate relief from one appli-
cation of your Anti-Neuralgic
Water, and have the greatest con-
fidence in recommending it to any
of my friends who suffer from this
distracting pain." Yours faithfully,

HERBERT LENTON.

PRICES:

2/9 & 4/6

Per Bottle.

Sent post paid from Depôt to any part of the
United Kingdom on receipt of price

KING'S SERVICE HOUSE, SOUTHSEA. BOARDING HOUSE FOR PORTSMOUTH GRAMMAR SCHOOL.

LONG LIST OF SUCCESSES in ARMY AND OTHER EXAMINATIONS. DECEMBER, 1901.

WOOLWICH.		SANDHURST.	
21st.	*H. W. GOLDNEY (1st in Latin) 9,735	10th	*G. G. OLIVER (2nd in Eng. His.) 8,429
	*W. H. FRY - - - 8,533	89th	J. J. BRAMBLE - - - 6,673
	*G. M. ROOME - - - 8,328		S. F. D. GREIG - - - 5,099
			W. J. H. RALSTON - - - 5,070

* 1st attempt.

Extra Tuition in Evenings by experienced Honour Men. Fees extremely moderate.

Illustrated Prospectus from J. HEWETSON, M.A., Oxon.

EASTBOURNE.

St. Bede's School

PREPARATORY FOR THE PUBLIC SCHOOLS AND
ROYAL NAVY.

Magnificent situation in Duke's Drive, Meads, the
healthiest part of Eastbourne.

Large House and Grounds, within 100 yards of the
Downs Sea bathing below, at foot of cliff.

RECENT NAVAL & PUBLIC SCHOOL SUCCESS.

TERMS MODERATE.

Apply for Prospectus to—

G. H. GOWRING, M.A., Oxon.,
Headmaster.

GERMANY.

Private Tuition.

ARMY, INDIA FORESTS, UNIVERSITIES.

Mr. W. HODGSON, M.A.,

ALTE BURG, AERZEN, PROV. HANNOVER.

A Limited Number of PUPILS received to be
Prepared for Competitive Examinations and for
Universities.

STAFF OF SIX RESIDENT TUTORS.

Special facilities for German & French.

House in Country.

Individual Instruction in ALL Subjects.

High-Class School

FOR DAUGHTERS OF . . .
OFFICERS AND GENTLEMEN.

Well situated in a beautiful country with good climate and gravel soil; within 20 minutes of Frankfort
o Main, with **Conservatoire of Music (formerly Raffe)**, Academy of Drawing and Painting, in Hanau.
First-class teaching in all general subjects; particular attention paid to languages and music. Church of
England. Home comforts and care.

The long residence of the principals in England, France, and India, fits them specially for the care of English
and Anglo-Indian children.

Children met in London, once a year, at Easter. At other times and places in England and on the Continent
according to agreement.

REFERENCES.

The Dowager Lady ASHBURTON, England.
Lady EVANS, Lovesgrove, Aberystwith, Wales.
Rev. A. O. & Mrs. HARDY, Smarden, Kent.
Madame de MAGNIN, Reims, France.
The Honble. Mrs. MARKER, Combe, Honiton, Devon.
Rev. B. DERDES, late Archdeacon of Lucknow,
Hawkhurst, Kent.
Surg-Maj. J. SYKES, M.D., Jhansi, N.W. India.

Rev. O. WATKINS, Archdeacon of Lucknow.
Prof. Dr. WIESE, Director of the Royal Academy,
Hanau o/Main.
Rev. J. GARFORTH, Spexhall Rectory, Halesworth,
Suffolk.
A. SCOTT, Esq., 72, Avonmore Road, Kensington,
London.

APPLY FOR PROSPECTUS TO THE PRINCIPALS—

MISS KÄHLER, Dpl. C.M.M.C.H.M., MISS A. KÄHLER, Dpl., 10, Grimmstrasse, Hanau o/Main, Germany.

Mr. A. D. BROWNJOHN, B.A.,

Camb.,

LYNTON HOUSE, RICHMOND, SURREY.

Prepares for all Army, University,
and Civil Service Examinations.

JULY, 1902—

MR. S. R. MAYERS, 8th I.P.

MR. F. A. J. MACKENZIE, 15th I.P.

MR. C. F. KILNER, 3rd R.M.L.I.

MR. H. F. HUDSON, Qualified for
India Cadetship.

First in German.

First in Geology.

Third in Mathematics ii.

FULL PROSPECTUS
ON APPLICATION.

.. FOR NEXT TERM. ..

PATON'S LIST OF SCHOOLS AND TUTORS

Gives Particulars, Fees, Views, etc., of Boys' and
Girls' Schools and Tutors preparing for Navy, Army,
and Universities.

720 pages, red cloth, post free, 1s. 6d.

J. & J. PATON, Educational Agents,
143, CANNON STREET, LONDON, E.C.

IF DETAILED STATEMENT of requirements
be given a Selection of Prospectuses of RELIABLE
SCHOOLS will be sent to Parents or Guardians free
of charge.

Army, University, & other Examinations.

Mr. J. L. WATSON, M.A., Oxon.,

Late Scholar of Brasenose, First Class Honours (formerly of Richmond House, Worthing), receives Four or Five Pupils for the above. Recent successes include—Cooper's Hill Admission; Direct Commission in the Royal Artillery (Militia Candidate); R.M.C., Sandhurst; Cambridge General for Degree.

**Address—MIDDLETON HOUSE,
BOGNOR, SUSSEX.**

. . Terms Moderate.

THIS EIGHTH-OF-PAGE

. TO LET .

FOR SCHOOL
ADVERTISEMENT
ONLY.

Apply:—

**MANAGER, ADVT. DEPARTMENT,
GRANVILLE HOUSE,
ARUNDEL STREET,
STRAND, LONDON, W.C.**

GERMANY.

Mr. A. V. H. ADAMS, M.A., Cantab.,

AND . . .

Mr. V. C. H. MILLARD,

M.A., Cantab., F.R.G.S.

(Assisted by an able and experienced Staff),

Prepare a limited number of PUPILS for all Army Examinations, India Forests, Indian Police, Cooper's Hill, Universities, &c., and all Competitive Examinations.

Strictly individual instruction in all subjects.
Special facilities for German and French.

Established 1873.
List of recent successes and Prospectus on application.

**Address:—5, DREISAMSTRASSE,
FREIBURG, BADEN,
GERMANY.**

MIDLANDS.

Private Tuition.

ARMY & UNIVERSITY EXAMINATIONS.

Rev. J. SCOTT RAMSAY, M.A.,

Receives a limited number of Pupils to be prepared for above.

Individual attention.

Advantages for Science.

Military Tutor and Sergeant-Instructor.

Healthy Neighbourhood.

**Great Casterton Rectory,
STAMFORD.**

LONDON.

Advice as to Choice of Schools.

THE SCHOLASTIC ASSOCIATION

(A body of Oxford and Cambridge Graduates),

Gives ADVICE and ASSISTANCE, without charge, to Parents and Guardians in the Selection of Schools (for boys or girls), and tutors for all examinations at home and abroad.

A detailed statement of requirements should be sent to the Manager, R. J. BEEVOR, M.A., 22, Craven Street, Northumberland Avenue, London.

Office hours for Interview, 10 to 5.

St. Monica's School

TADWORTH, SURREY.

TWENTY GIRLS RECEIVED.

Charming country, bracing climate, within twenty miles of London.

Staff of University and Foreign Mistresses. Sound Intellectual and Physical Training, combined with the advantages of a cultured and refined home.

Arrangements are made for the care of girls during the holidays, special facilities being afforded for travel at home and on the Continent.

Principal - - Miss LOUISA HEATH-JONES

School Outfits

OF **SAMUEL
BROTHERS,**
LTD.,

65 and 67, Ludgate Hill,
London, E.C.

CATALOGUES FREE

The Secretary of the Royal United Service Institution will be glad to receive any old Portraits, Battle Prints, and Sketches of a Naval and Military character. Any old Badges, Shoulder-belt Plates, or War Medals will be gladly accepted for the Museum.

NO GLASS CHIMNEY TO BREAK



KEEP WARM

And be Healthy & Comfortable.

A CANADIAN OIL HEATER

Will give every satisfaction.

Light and Portable; a child can carry it from room to room as required. Suitable for Bed-room, Chambers, Offices, Drawing-room, Hall, Conservatory. Can be used to make tea and do light cooking, a useful and ornamental Heater. The OIL TANK is made of sheet copper, stamped in one piece, WITHOUT SEAM or JOINT. It cannot leak or rust, nor spoil carpets. Cold air is drawn from floor, passing over the oil tank on all sides, keeping the OIL ALWAYS COOL, avoiding any danger of explosion, and preventing any odour from heated oil.

Weight 14 pounds.
32 inches in height.

Price 40/-

Every Heater guaranteed.

Carriage Paid to any Railway Station in Great Britain.

Call and examine, or send orders direct to

CANADIAN OIL HEATER CO.,
21, Cockspur Street, London, S.W.

Royal United Service Institution.

PRIZE ESSAY GOLD MEDALLISTS with rank at time of Essay.

- 1874. Captain H. W. L. HIME, Royal Artillery.
- 1875. Commander GERARD H. U. NOEL, R.N.
- 1876. Lieutenant JOHN F. G. ROSS OF BLADENBURG, *p.s.c.*, Coldstream Guards.
- 1877. No Medal Awarded.
- 1878. Captain EMILIUS CLAYTON, *p.s.c.*, Royal Artillery.
- 1879. Captain the Hon. EDMUND R. FREMANTLE, C.B., C.M.G., A.D.C., R.N.
- 1880. Captain J. K. TROTTER, *p.s.c.*, Royal Artillery.
- 1881. Captain LINDSAY BRINE, R.N.
- 1882. No Medal Awarded.
- 1883. Captain CHARLES JOHNSTONE, R.N.
- 1884. Captain G. F. BROWNE, *p.s.c.* Northamptonshire Regiment.
- 1885. Lieutenant FREDERICK C. D. STURDEE, R.N.
- 1886. Captain C. E. CALLWELL, *p.s.c.*, Royal Artillery.
- 1887. No Medal Awarded.
- 1888. Captain J. F. DANIELL, *p.s.c.*, R.M.L.I. (Military Medal).
- 1889. Captain HENRY F. CLEVELAND, R.N.
- 1890. Captain G. E. BENSON, *p.s.c.*, Royal Artillery.
- 1891. Captain ROBERT W. CRAIGIE, R.N.
- 1892. Lt.-Colonel J. FARQUHARSON, C.B., *p.s.c.*, Royal Engineers.
- 1893. Commander F. C. D. STURDEE, R.N.
- 1894. Major F. B. ELMSLIE, Royal Artillery.
- 1895. Commander J. HONNER, R.N.
- 1896. Captain G. F. ELLISON, *p.s.c.*, The Queen's (Royal West Surrey Regiment).
- 1897. Commander GEORGE A. BALLARD, R.N.
- 1898. Captain W. B. BROWN, Royal Engineers.
- 1899. Commander GEORGE A. BALLARD, R.N.
- 1900. No Medal Awarded.
- 1901. Lieutenant LIONEL H. HORDERN, R.N.

THE SCOTTISH WIDOWS' FUND



Life Assurance Society

*The Whole Funds and Profits
Belong to the Members*

Accumulated Funds . . £16,000,000

Annual Revenue . . . £1,650,000

Persons desiring to effect Life Assurances

Should Read the Society's Prospectus

Containing valuable information for guidance in selecting an Office.

EDINBURGH: 9 ST. ANDREW SQUARE. LONDON: 28 CORNHILL, E.C. & 5 WATERLOO PLACE, S.W.

Dublin . . . 41 Westmoreland St.

Glasgow . . . 114 W. George Street.

Liverpool . . . 48 Castle Street.

Leeds . . . 21 Park Row.

Bristol . . . 28 Baldwin St.

Belfast . . . 2 High Street.

Manchester . . . 21 Albert Square.

Birmingham . . . 12 Bennett's Hill.

Newcastle . . . 12 Grey Street.

Agencies in all the Principal Towns in the United Kingdom



THE "DANDIE DINMONT" LIQUEUR SCOTCH WHISKY.

Dr. STEVENSON MADAMAM says:

"A Genuine First-Class Spirit." "Well Matured." "Free from Fusel Oil." "Of Pure and Excellent Quality."

When you ask for "Special Scotch," see that you get "Dandie Dinmont," the perfection of all Scotch Whiskies.

42/- per 1 doz. Case, Carriage Paid.

SOLE PROPRIETORS:

A. ALEXANDER & CO.,
DISTILLERS,
LEITH, SCOTLAND.

FEE 60 GUINEAS.

School Ship "CONWAY," LIVERPOOL.



**For Training Young Gentlemen to become
Officers in Merchant Steamers.**

For PROSPECTUS apply to the Captain,

A. T. MILLER, R.N.

Retail Price,
2/- each.



THE NEW . . . SPARKLET SYPHON

Can now be re-filled at home at the small cost of

Per **1/4** Dozen.

This is the latest improved form of Sparklet Bottle, and is charged by ONE LARGE SPARKLET BULB. The contents can be drawn off in small quantities as required.

AERATORS, LTD., 120, Oxford Street, London, W.

ROYAL SCHOOL For Naval and Marine Officers' Daughters. (LATE THE ROYAL NAVAL FEMALE SCHOOL.) **St. Margaret's, TWICKENHAM.**


Patron - - - - HIS MOST GRACIOUS MAJESTY THE KING.
President - - - - REAR-ADMIRAL H.R.H. THE PRINCE OF WALES.

There are £300 in Scholarships annually awarded. Prizes of Books are also Distributed. The School is annually examined under the Oxford Examination Delegacy.

Contributions are earnestly solicited. Further information to be obtained at the Office, 32, SACKVILLE STREET, LONDON, W.

SAMUEL RAYSON, Secretary.

THE KING

E  *R*

has intimated his pleasure that the
Prince of Wales's Hospital Fund for London
established by His Majesty when Prince of Wales,
shall be known as
**KING EDWARD'S HOSPITAL FUND
FOR LONDON.**

New Address: 81, CHEAPSIDE, E.C.

SIR W. A. ROSE & CO.,
Manufacturers of Finest
PAINTS, OILS, VARNISHES.
Contractors to the Admiralty and War Office.

**66, Upper Thames St., and Rose's Wharf,
LONDON.**

THE ADVERTISEMENT DEPARTMENT OF THIS JOURNAL IS CONDUCTED IN C. GILBERT-WOOD'S ADVERTISING
OFFICES, GRANVILLE HOUSE, ARUNDEL STREET, STRAND, LONDON, W.C., WHERE ALL
COMMUNICATIONS SHOULD BE ADDRESSED.
TELEPHONE NO. 4680, GERBARD.

